Airspace Change Proposal
Stage 2B

Initial Options Appraisal

London Southend Airport FASI(S)

20 December 2022

CPJ-5641-RPT-035 V1.0

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Executive Summary

The Civil Aviation Authority wrote to 21 airports in the South-East of England (including London Southend Airport) to advise them that it is essential that they participate in a programme of Airspace Modernisation. This programme consists of a coordinated attempt to improve the efficiency of airspace usage across the region, whilst implementing the latest technology. It aims to reduce the environmental impacts associated with aviation.

London Southend Airport passed the Civil Aviation Authority CAP 1616 Stage 1 Gateway in March 2022 and commenced Stage 2 activities. A comprehensive list of options was developed through internal workshops and stakeholder engagement. These options were assessed against the Design Principles developed during Stage 1 of the Airspace Change Proposal process. They are detailed in the Options Development and Design Principle Evaluation document which can be found on the Airspace Change Portal and forms the first part of the Stage 2A submission.

Workshops were held on the 08 April 2022, which introduced the list of options to stakeholders and our assessment of options against the Design Principles they helped develop. Stakeholders were asked to provide feedback which was incorporated into the Design Principle Evaluation document which can also be found on the Airspace Change Portal and forms the second part of the Stage 2A submission.

This document is our Stage 2B submission, the Initial Options Appraisal. It is a high-level qualitative appraisal of the options we developed during Stage 2A. This document covers the options for assessment, methodology and the Initial Options Appraisal. In the conclusion, we detail the options not being progressed to Stage 3 of this FASI(S) Airspace Change Proposal.

Glossary

Abbreviation	Term	Description
ACOG	Airspace Change Organising Group	
ACP	Airspace Change Proposal	
AMS	Airspace Modernisation Strategy	
ANSP	Air Navigation Service Provider	
AONB	Area of Outstanding Natural Beauty	
ATC	Air Traffic Control	
ATCO	Air Traffic Control Officer	
CAA	Civil Aviation Authority	
CAS	Controlled Airspace	
CCO	Continuous Climb Operations	
CDA	Continuous Descent Arrival	
DA	Danger Area	
DFT	Department for Transport	
FAS	Future Airspace Strategy	
FASI-S	Future Airspace Implementation South	
FASI-N	Future Airspace Implementation North	
FREE FLOW		Free flow is a method of departure whereby a tower does not have to coordinate the release of individual aircraft.
GA	General Aviation	
GNSS	Global Navigation Satellite Systems	
ICAO	International Civil Aviation Organisation	
IAP	Instrument Approach Procedures	
IOA	Initial Options Appraisal	
LTMA	London Terminal Manoeuvring Area	
LSA	London Southend Airport	
NAP	Noise Abatement Procedure	
NERL	NATS En-Route Limited	

Abbreviation	Term	Description
NM	Nautical Mile	
NTK	Noise and Track Keeping	Taken over a three-month period in 2019- pre pandemic.
PBN	Performance-Based Navigation	
RAMSAR		Wetlands of international importance designated under the Ramsar Convention.
RNAV	Area Navigation	
RSPB	Royal Society of the Protection of Birds	
RW	Runway	
SID	Standard Instrument Departures	
SPA	Special Protection Area	
STAR	Standard Arrival	
UK	United Kingdom	
VOR	VHF Omni-Directional Radio Range	

References

[1] Commission Implementing Regulation EU 2018/1048, PBN-IR.

[2] Civil Aviation Authority, CAP 1616, 1 March 2021, Version 4.

[3] Civil Aviation Authority, CAP 2312B: UK Airspace Change Masterplan Iteration 02, 11 May 2022, Version 2.2.

[4] CPJ-5641-RPT-017, LSA Options Development and Design Principle Evaluation, 14 November 2022.

[5] CPJ-5641-RPT-020, LSA Design Principle Evaluation, 9 November 2022.

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1. Introduction

1.1. Airspace Modernisation Strategy

Question: Why does London Southend Airport need more change?

1.1.1. The Civil Aviation Authority (CAA) published its Airspace Modernisation Strategy (AMS) in December 2018. This Strategy was developed in response to the Department for Transport (DFT), tasking the CAA with preparing and maintaining a co-ordinated plan for the use of the United Kingdom (UK) Airspace up to 2040, including modernisation.

1.1.2. The AMS, which replaced the Future Airspace Strategy (FAS), sets out the ways, the means and ends of modernising airspace through 15 initiatives intended to modernise the Design, Technology and Operations of airspace. Amongst other initiatives, this includes a fundamental redesign of the terminal route network using precise and flexible satellite navigation.

1.1.3. The AMS sets out factors that airspace modernisation must deliver, drawn from Section 70 of the Transport Act 2000, and relevant policy, as:

- The need to increase aviation capacity in the South-East.
- For this growth to be sustainable; and
- for the need to make the best use of existing runways.

1.1.4. The UK's Airspace, particularly that of southern England, was originally designed decades ago; it has evolved over time to manage the increasing volumes of climbing and descending aircraft travelling to and from the various airports all within close proximity. This complex evolution has resulted in an environmentally inefficient and overly complicated design that places a burden on Air Traffic Controller Officers (ATCOs) and limits airspace capacity. Prior to the worldwide pandemic, flights in southern England were forecast to double over the next 20 years. Whilst COVID-19 has undoubtedly had a significant impact upon the aviation and travel industries, if the airspace is not modernised, the benefits of reduced carbon emissions and noise reduction may not be realised.

1.1.5. The Airspace Change Organising Group (ACOG) was established in 2019, as a fully independent organisation at the request of the DFT and CAA, to coordinate the delivery of key aspects of the AMS.

1.1.6. The requirement for ACOG is to coordinate the delivery of two major national airspace change programmes known as Future Airspace Implementation South (FASI-S) and Future Airspace Implementation North (FASI-N). FASI-S is a complete redesign of the existing airspace structure in southern England and London Southend Airport (LSA) is one of 13 airports included within this programme.

1.1.7. ACOG, in collaboration with NATS En-Route Limited (NERL) and each of the Airports, must deliver a Masterplan that provides detailed information on the Airspace Design options. The Masterplan must consider potential areas of overlap between individual Airspace Change Proposals (ACPs), the compromises and trade-offs that may need to be made to integrate them effectively.

1.1.8. LSA and the other airports must ensure that their modernisation proposals are aligned with neighbouring airports and connect efficiently with the upper airspace. The FASI(S) airports are responsible for modernising or upgrading their individual arrival and departure routes up to 7,000ft. NERL are responsible for redesigning the route network above 7,000ft. Therefore, it is possible that despite the new Standard Instrument Departures (SIDs) and the Instrument Approach Procedures (IAPs) not having been implemented yet, alterations may be required to comply with the Overarching Airspace Plan for the region.

1.1.9. For more information, including a brief video, on the importance of modernising UK airspace, see https://www.ourfutureskies.uk/why-modernise/.

Question: Why are you seeking my opinion on your airspace again?

1.1.10. LSA are aware that you were asked to participate on several ACP consultations over the last few years and that it may seem odd that we are coming to you again for feedback on further changes to the airspace. The ongoing ACPs were specifically for the introduction of new SIDs and IAPs that utilised modern navigation methods, namely Performance-Based Navigation (PBN). However, the LSA SIDs ACP has now been withdrawn in favour of progression as part of this ACP process. Please be assured that your time and consideration on the introduction of these new procedures has not been wasted and the proposals are with the CAA for their final decision. The procedures comply with the AMS and form a part of the modernisation programme. However, as the process of the FASI-S development evolves, the procedures may ultimately require amendment to accommodate other changes in the region. This should not be seen as a negative, rather an opportunity to further improve the overall construct for all stakeholders.

1.2. Performance-Based Navigation

1.2.1. One of the major aims of the AMS is to optimise future airspace designs to take account of modern aircraft performance and functional capabilities and make them more efficient, saving time and fuel and reducing emissions.

1.2.2. The key to achieving this is through the application of PBN. In parallel, the UK navigation infrastructure can also be optimised to take advantage of the lateral navigation accuracy from Global Navigation Satellite Systems (GNSS), while retaining adequate conventional ground-based navigation aids to ensure both resilience and contingency measures.

1.2.3. PBN is being adopted world-wide. Airspace will be modernised through International, Regional and State level initiatives, including regulations. It impacts both the high-level airways and the lower-level arrival and departure routes into and out of airports and IAPs.

1.2.4. European-wide legislation: Commission Implementing Regulation EU 2018/1048, PBN-IR [1] was developed to drive the deployment of PBN in the European region to meet the international vision laid down by the International Civil Aviation Organisation (ICAO).

1.3. Impact

1.3.1. LSA has already commenced the modernisation of its airspace having submitted a proposal for the introduction of PBN procedures in the form of Area Navigation (RNAV) IAPs. In

addition, the FASI(S) programme may require the Airport to implement new arrival transitions, that would enable aircraft to establish on an IAP into the Airport.

1.3.2. It is possible that in the development of options for the new departure and arrival profiles for the other airports in the region, that the existing controlled airspace structures may also require re-configuration.

1.4. Civil Aviation Publication 1616 Process

1.4.1. ACPs are conducted using an established process, CAP 1616[2]. The ACP is designed to be transparent, comprehensible, and proportionate, and is aligned to the Government's policy[3] on managing airspace.

1.4.2. The 7-Stage process contains 14 'Steps' and 4 'Gateways'. The Change Sponsor must satisfy the CAA at each of these 'Gateways' that it has fully followed the process. Failure to do so results in the need to conduct further work until such time as the CAA is satisfied.

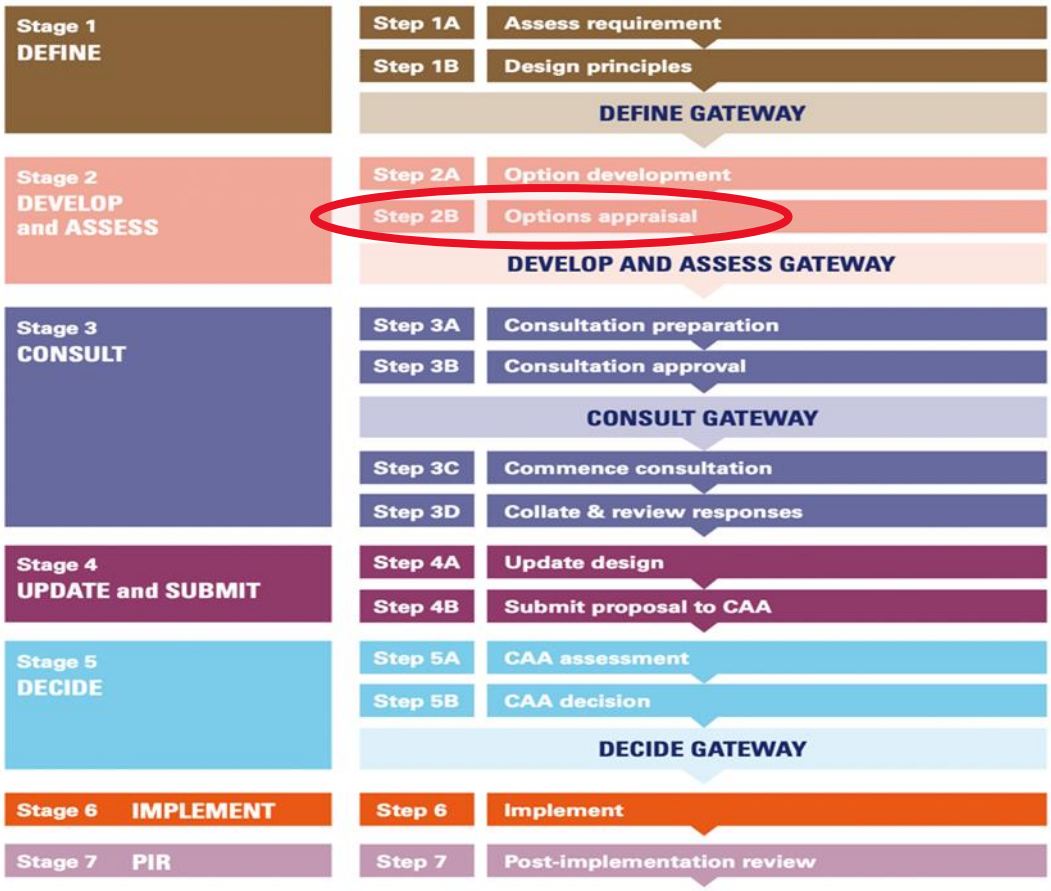


Figure 1: The CAP 1616 Process

1.5. Stage 1

1.5.1. LSA re-started their ACP in September 2021 and subsequently passed through the Stage 1 Gateway, of the CAP 1616 process, in March 2022. The Stage 1 documentation can be found on the ACP Portal.

1.6. Stage 2A

1.6.1. Stage 2A requires change sponsors to develop and assess options for the Airspace Change. LSA's Stage 2A documentation is on the Airspace Change Portal and details the list of options[4] that were developed for this ACP, and the associated Design Principle Evaluation[5].

1.7. Stage 2B

1.7.1. Stage 2B requires change sponsors to undertake an Initial Options Appraisal (IOA) on the options developed during Stage 2A. This document contains the IOA for the individual options assessed in Stage 2A.

1.8. Stakeholder Updates

1.8.1. An online update session was held on the 29 November 2022 to inform stakeholders of the progress of this ACP. A presentation was given, which can be found on the Airspace Change Portal. The content of this update session included:

- Overview of FASI(S) ACP and update on ACP progress.
- Stage 2A.
- Stage 2B.
- Gateway and Timeline.
- Next steps.
- Opportunity for Questions.

2. Options for Assessment

2.1. Departures runway 05 – Northeast

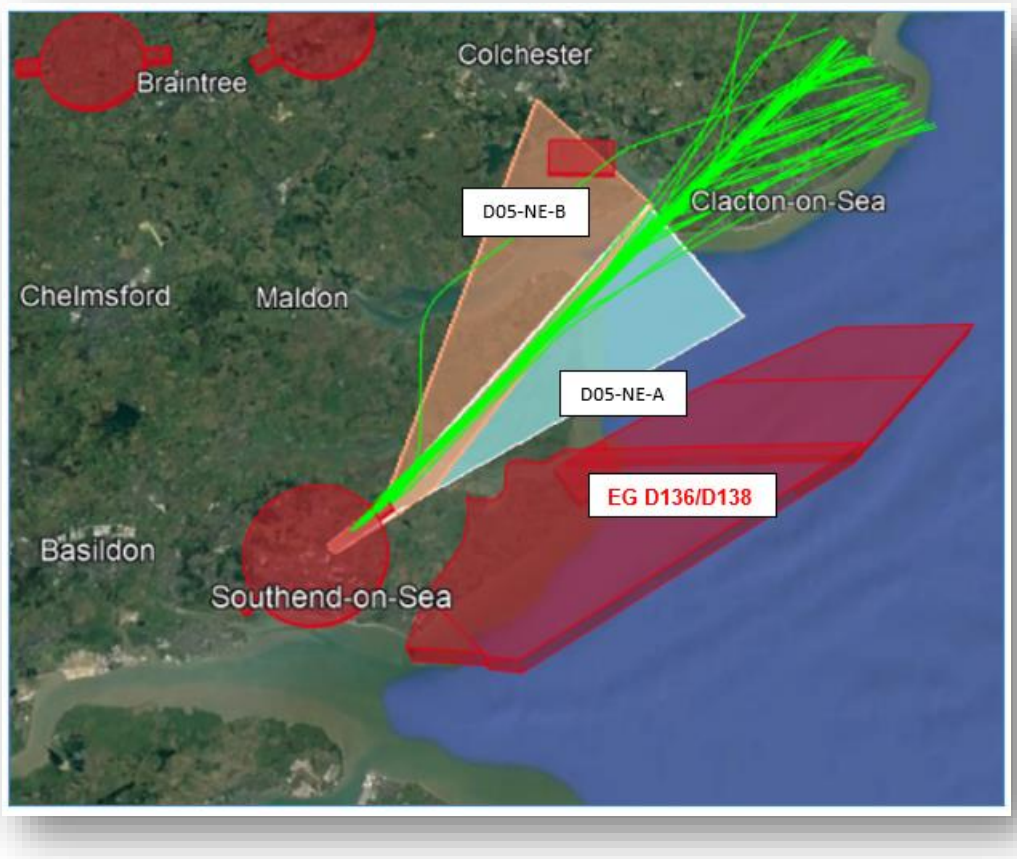


Figure 2: Departures Runway 05 - Northeast

Baseline

Departures to the Northeast from Runway (RW) 05 typically route straight ahead with a slight deviation to the left of track as is evidenced by the Green Noise and Track Keeping (NTK) data Options have been assessed against these nominal tracks, depicted by the green lines on the maps. Whilst these tracks fall into the parameters of Option A, we have assessed the option in its entirety against the Baseline tracks and other options for this departure direction.

Options

- D05-NE-A.
- D05-NE-B.

2.2. Departure Runway 05 – Northwest

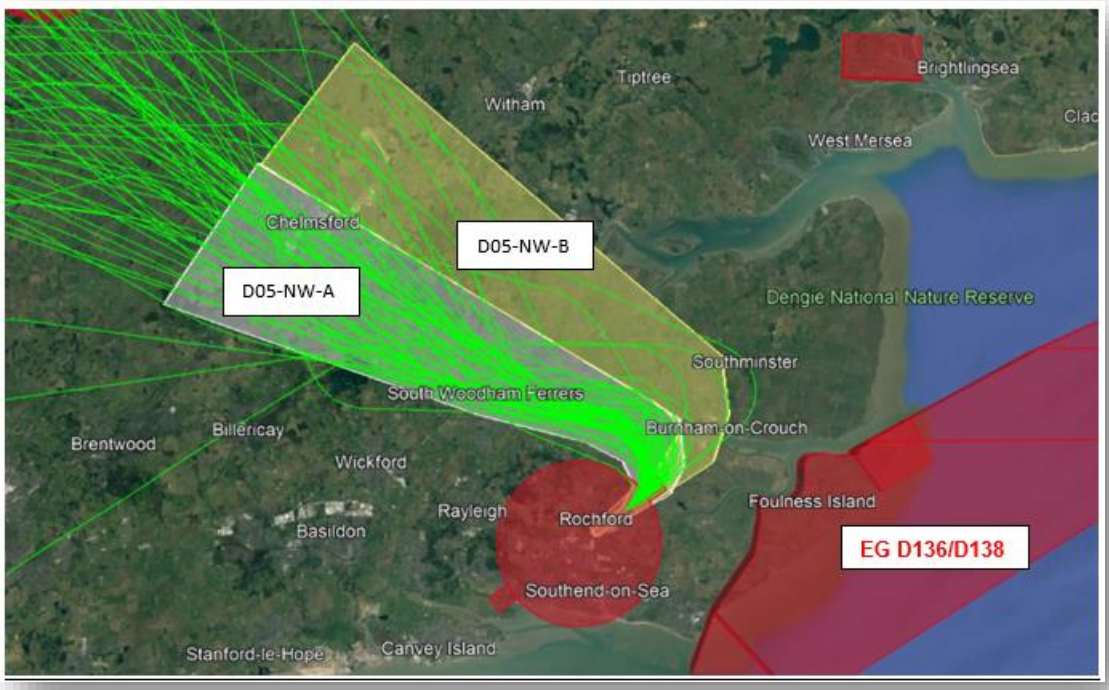


Figure 3: Departures Runway 05 - Northwest

Baseline

Departures to the Northwest from RW05 turn directly to the Northwest, after adherence to the Noise Abatement Procedures (NAPs). However, as can be seen by the track data these tracks disperse quite broadly once North-abeam the Airport. These tracks provide the Baseline for these options and form part of Option A. Whilst these tracks fall into the parameters of Option A, we have assessed the option in its entirety against the Baseline tracks and other options for this departure direction.

Options

- D05-NW-A.
- D05-NW-B.

2.3. Departure Runway 05 – South/Southeast

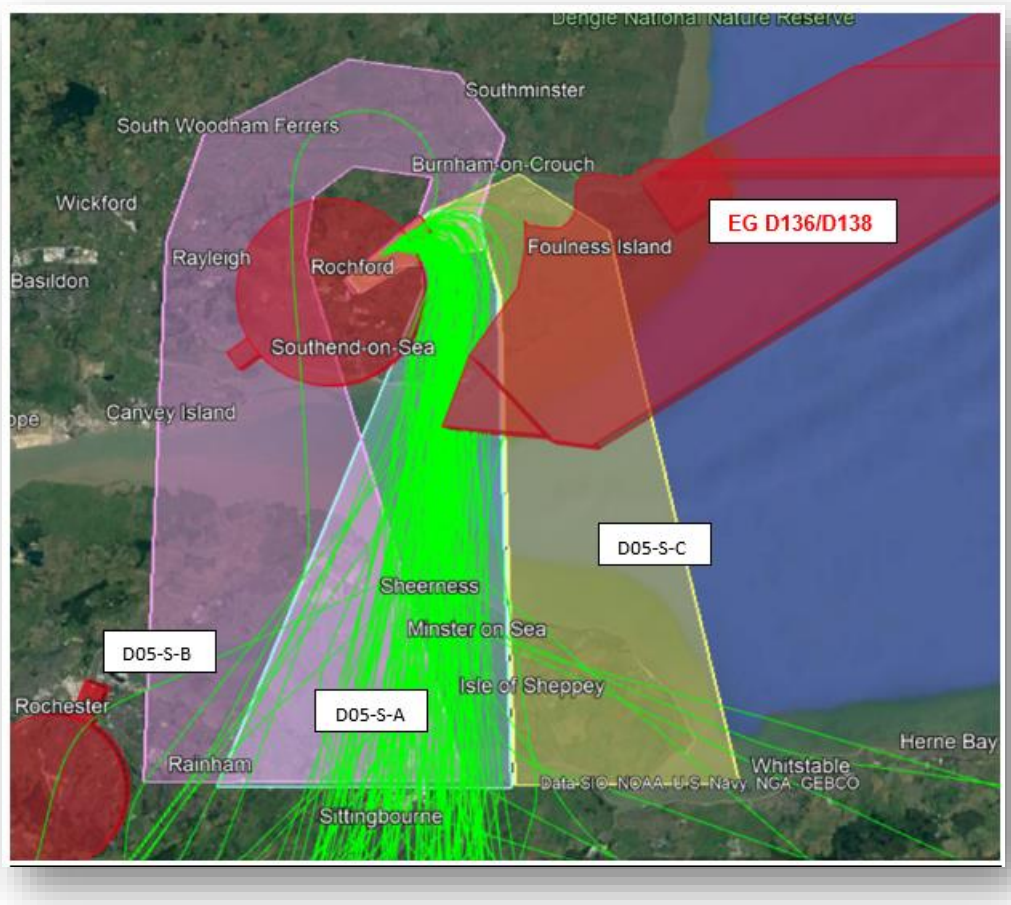


Figure 4: Departures Runway 05 - South/Southeast

Baseline

The Departures to the South from RW05 turn, once they have adhered to the NAPs, and route directly to the South. Shown in **Figure 4** by the green NTK data. These tracks provide the Baseline for this set of options. Whilst these tracks fall inside the parameters of Option A, we have assessed each option in its entirety against the Baseline tracks and other options for this departure direction.

Options

- D05-S-A.
- D05-S-B.
- D05-S-C.

2.4. Departures Runway 23- Northeast

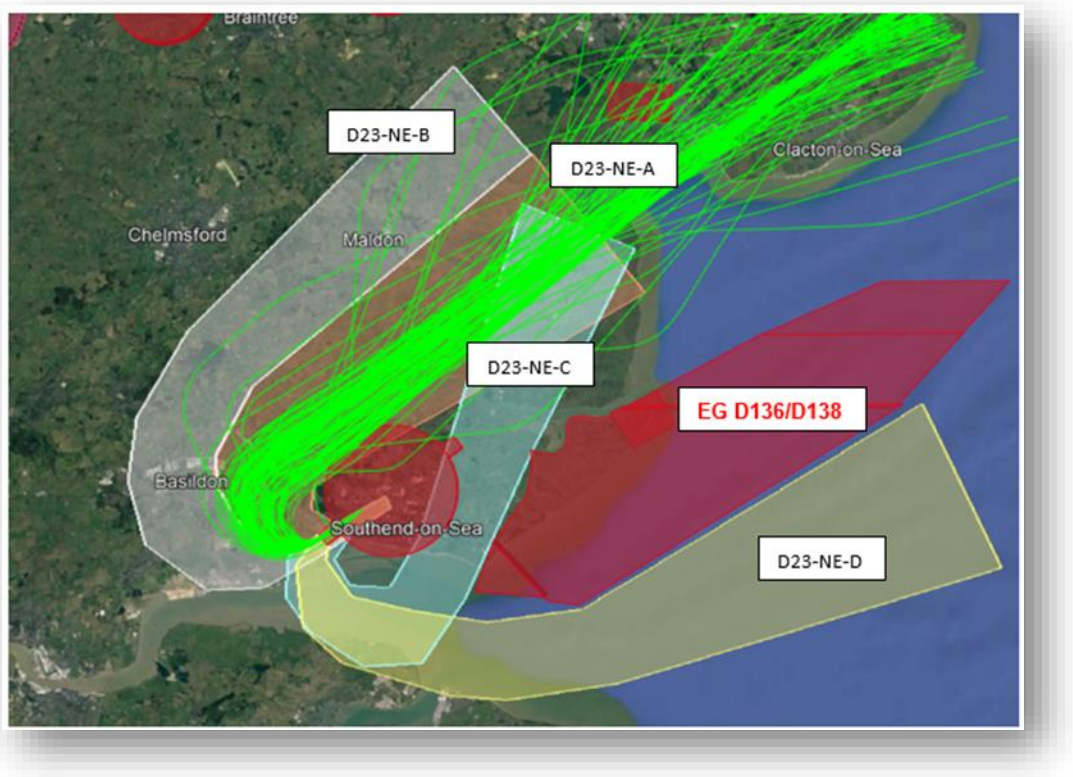


Figure 5: Departures Runway 23 - Northeast

Baseline

Departures bound for the Northeast from RW23 turn, upon adherence to the NAPs, and remain in quite a tight and direct Northeasterly swathe; this is replicated in Option A (D23-NE-A). Options have been assessed against these nominal tracks, depicted by the green lines (NTK) on the maps (Whilst these tracks fall into the parameters of Option A, we have assessed the option in its entirety against the Baseline tracks and other options for this departure direction.

Options

- D23-NE-A.
- D23-NE-B.
- D23-NE-C.
- D23-NE-D.

2.5. Departures Runway 23 – Northwest

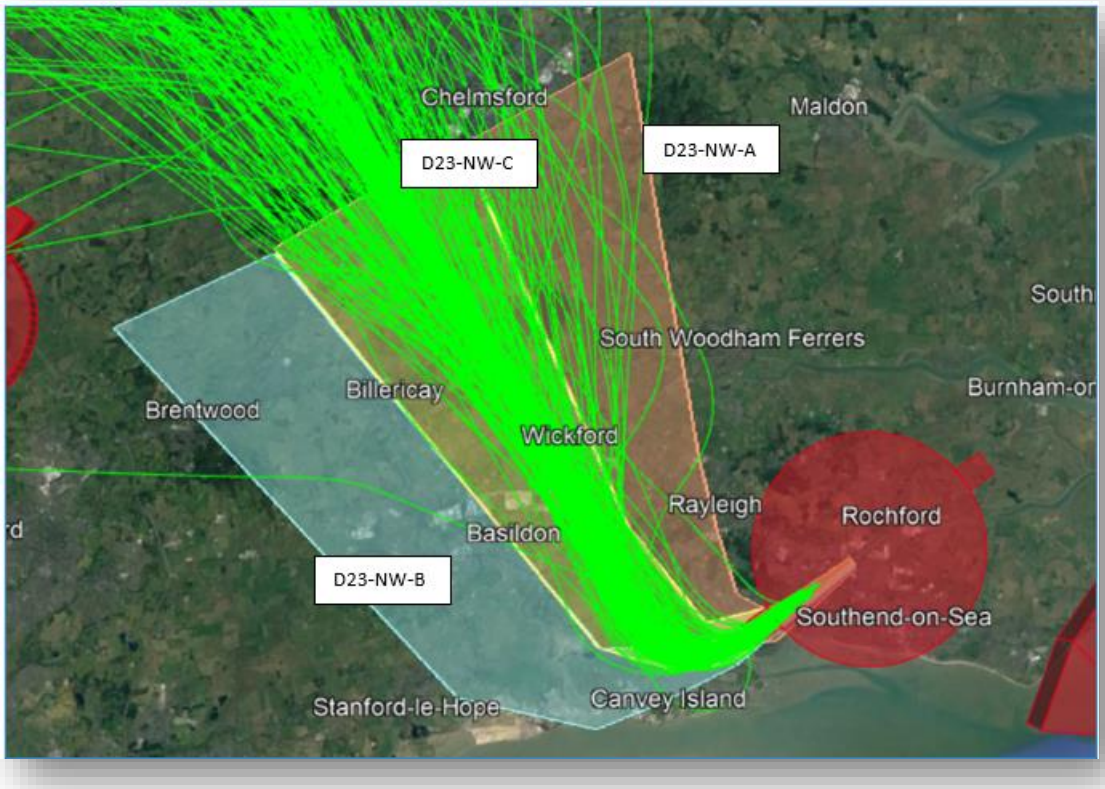


Figure 6: Departures Runway 23 - Northwest

Baseline

Departures to the Northwest from RW23 turn, on adherence to the NAPs, and don't fan out too broadly until aircraft are 15-20nms Northwest of LSA. Option C (D23-NW-C) seeks to replicate the current operation. Options have been assessed against these nominal tracks, depicted by the green lines (NTK) on the map Whilst these tracks fall into the parameters of Option C, we have assessed the option in its entirety against the Baseline tracks and other options for this departure direction.

Options

- D23-NW-A.
- D23-NW-B.
- D23-NW-C.

2.6. Departures Runway 23 – South/Southeast

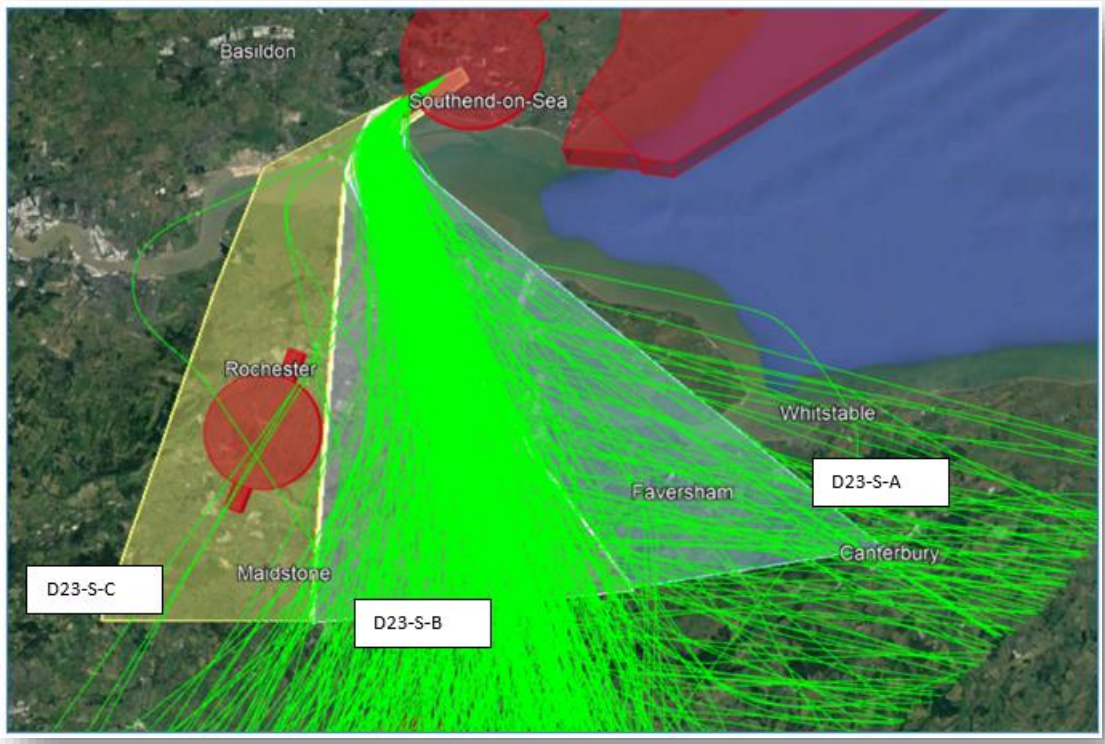


Figure 7: Departures Runway 23 - South/Southeast

Baseline

Departures to the South from RW23 turn south, upon adherence to the NAPs, and start to fan out approximately 10-15nms after departure. Options have been assessed against these nominal tracks, depicted by the green lines on the maps. Whilst these tracks mainly fall into the parameters of Option B, we have assessed the option in its entirety against the Baseline tracks and other options for this departure direction.

Options

- D23-S-A.
- D23-S-B.
- D23-S-C.

2.7. Arrivals Runway 05 – Northwest

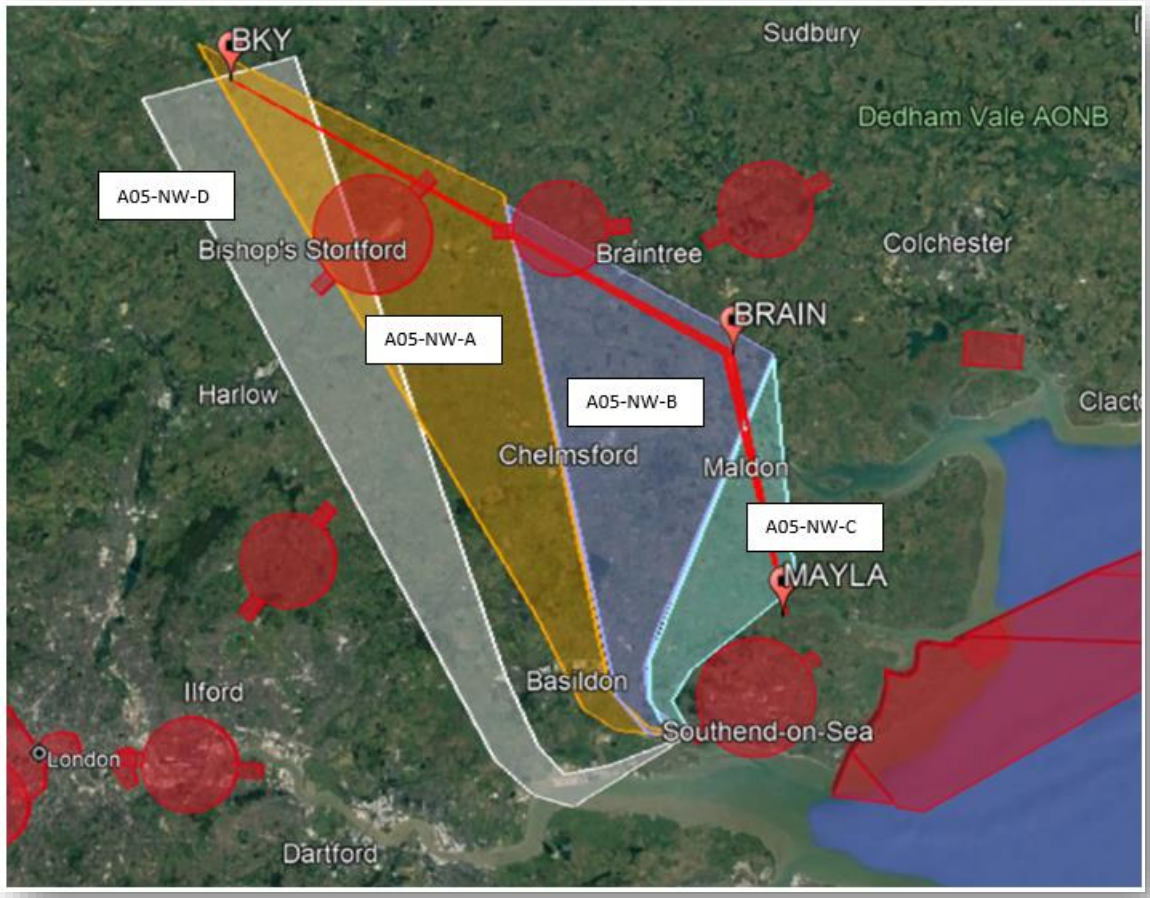


Figure 8: Arrivals Runway 05 - Northwest

Baseline

The existing Standard Arrival (STAR) from Barkway (BWY) routes to BRAIN and then hold in the vicinity of MAYLA, shown above and by the red track. This forms our Baseline for these options.

Options

- A05-NW-A.
- A05-NW-B.
- A05-NW-C.
- A05-NW-D.

2.8. Arrivals Runway 05 –South and East

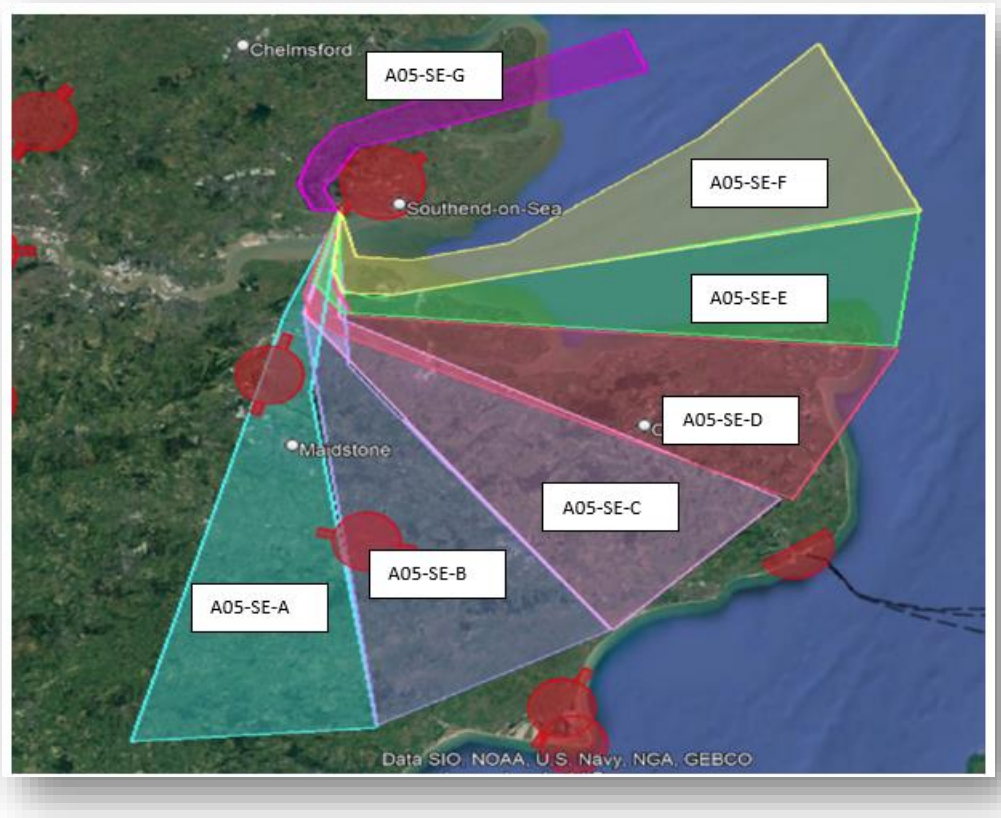


Figure 9: Arrival Runway 05 - Northwest

Baseline

The existing STAR from the South and the East routes to ADVAS and then the hold at GEGMU. This is shown by Option G and forms our Baseline for these options.

Options

- A05-SE-A.
- A05-SE-B.
- A05-SE-C.
- A05-SE-D.
- A05-SE-E.
- A05-SE-F.
- A05-SE-G.

2.9. Arrivals Runway 23 – Northwest

Figure 10: Arrivals Runway 23 - Northwest

Baseline

The arrival options to RW 23 from the Northwest largely follow the existing track of the STAR as it represents the most expeditious routing and forms our Baseline.

Options

- A23-NW-A.
- A23-NW-B.

2.10. Arrivals Runway 23 – South and East

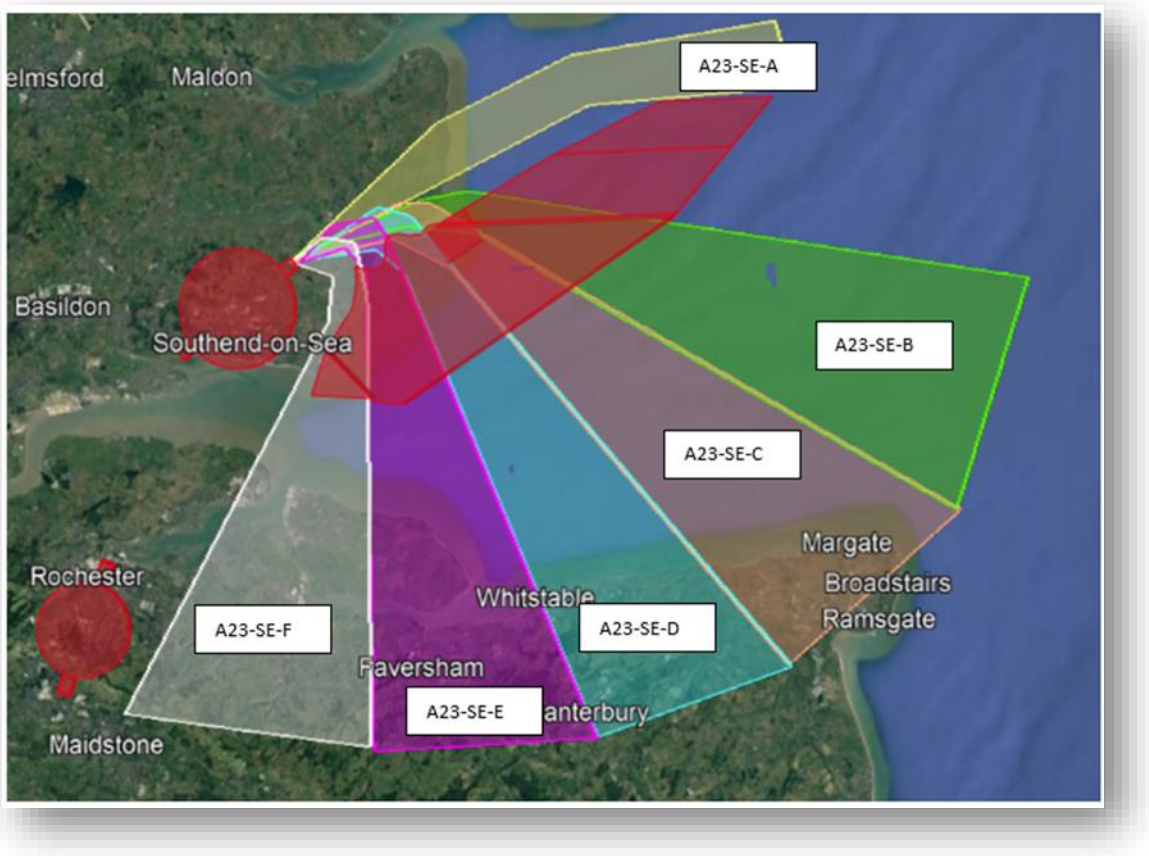


Figure 11: Arrivals Runway 23 - South and East

Baseline

The existing STAR from the South and the East routes to ADVAS and then to the hold at GEGMU, shown above. This is captured in Option A and forms our Baseline for these options.

Options

- A23-SE-A.
- A23-SE-B.
- A23-SE-C.
- A23-SE-D.
- A23-SE-E.
- A23-SE-F.

3. Methodology

3.1. Initial Options Appraisal

3.1.1. This Initial Options Appraisal (IOA) is the first of three appraisals that will be conducted during the CAP1616 process. It is a high-level qualitative assessment of the options, defined in Stage 2A, against pre-defined criteria laid down in **CAP1616 Appendix E** and includes a safety assessment.

3.1.2. The purpose of this appraisal is to show the positives, negatives, benefits and impacts of each option based on high level qualitative assessment conducted by subject matter experts.

3.1.3. Each option is assessed in isolation. Interdependencies between options will be explored at Stage 3 in collaboration with neighbouring airports and the enroute network.

3.1.4. These options are assessed based on the present day; we have not taken external changes into account at this stage. Future planned housing and industrial developments will be considered for each option taken forward to Stage 3 at the second options appraisal.

3.1.5. This qualitative initial options appraisal does not consider traffic forecasts. Future traffic forecast will be provided and utilised during the Stage 3 options appraisal including projected numbers of air passengers and cargo.

3.1.6. Two other documents have been submitted to support this options appraisal, LSA Options Development and Design Principle Evaluation[4] and LSA Design Principle Evaluation [5] these can be found on the Airspace Change Portal.

3.2. Assessment Criteria Summary

3.2.1. The table below details the IOA methodology that has been followed to undertake an initial assessment of our options.

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	A qualitative assessment of changes to the noise impact for each option when compared to the Baseline option.
	Air Quality	A qualitative assessment of changes to the local air quality for each option when compared to the Baseline option. This has been done using high level overflight assessments of each option.
Wider society	Greenhouse gas impact	A qualitative assessment of changes to the greenhouse gas impact for each option when compared to the Baseline. This has been done by considering the difference in track miles to give an indication of the overall impact.
	Capacity/ resilience	A qualitative assessment of changes to airspace capacity and resilience for each option when compared to the Baseline option.
	Tranquillity	A qualitative assessment of changes to the tranquillity impact for each option when compared to the Baseline option. This has been done paying particular attention to the Royal Society of the Protection of Birds (RSPB), RAMSAR sites and AONBs in the vicinity of the option. Following feedback from Natural England we have assessed each option and the sites of tranquillity where aircraft would be below 2000ft. We have done this by assessing each departure option within 6NM of the airfield (using an approximate climb gradient of 6%), and each arrival option within 10NM of the airfield (using the appropriate descent gradient for the runway). This is depicted by the orange track in the centre of each swathe, in each of the screenshots.
General aviation	Access	A qualitative assessment of changes to the General Aviation (GA) access to airspace for each option when compared to the Baseline option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	A qualitative assessment of the economic impact for GA and commercial airlines from changes to capacity for each option when compared to the Baseline option.
	Fuel burn	A qualitative assessment of changes to the impact to fuel burn for GA and commercial airlines for each option when compared to the Baseline option. This has been done by considering the difference in track miles to give an indication of the overall impact.
Commercial airlines	Training costs	A qualitative assessment of changes to commercial airline training costs for each option when compared to the Baseline option.

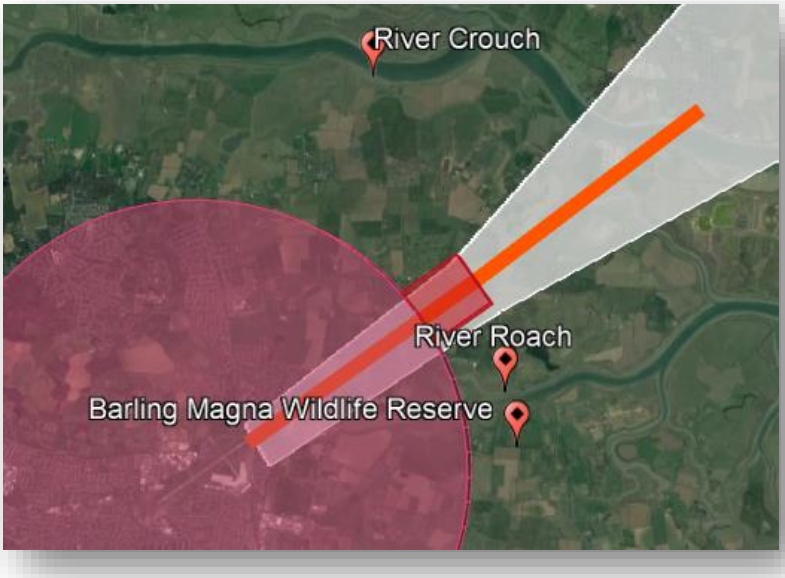
Group	Impact	Qualitative Assessment
	Other costs	A qualitative assessment of changes to additional commercial airline costs for each option when compared to the Baseline option.
Airport/ Air navigation service provider	Infrastructure costs	A qualitative assessment of changes to infrastructure costs for the Airport and/or Air Navigation Service Provider (ANSP) for each option when compared to the Baseline option.
	Operational costs	A qualitative assessment of changes to operational costs for the Airport and/or ANSP for each option when compared to the Baseline option.
	Deployment costs	A qualitative assessment of deployment costs for the Airport and/or ANSP for each option when compared to the Baseline option.
All	Safety	A qualitative safety assessment for each option when compared to the Baseline option.

Table 1: IOA Methodology

4. Initial Options Appraisal – Departures Runway 05

4.1. D05-NE-A

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This Design option would initially overfly the same communities as the Baseline after take-off. After the Baseline route turns left, similar communities would be overflown, although this option would generally be further from populated areas.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	This option is broadly similar to the Baseline so limited opportunity for increased capacity or resilience is anticipated. The intention for this option is to facilitate free-flow for Departures from the Airport which enables significant increases in both capacity and resilience.

Group	Impact	Qualitative Assessment
	Tranquillity	Aircraft currently overfly the Crouch and Roach Estuaries Special Protection Area (SPA). Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will be very little, if any, increased impact to sites of tranquillity. Should the final route fall to the eastern edge of option D05-NE-A, then Wallasea Island could see a marginal increase in overflights below 2000ft. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option is broadly similar to the Baseline. Limited opportunity for increased capacity or benefit to economic impact is anticipated.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.

Group	Impact	Qualitative Assessment
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This may contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns at this stage, this option has minimal difference from today's Baseline operation.

Table 2: D05-NE-A

4.2. D05-NE-B

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would initially overfly the same communities as the Baseline after take-off. After the Baseline route turns left, similar communities would be overflown, although this option would generally be closer to populated areas.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	This option is broadly similar to the Baseline so limited opportunity for increased capacity or resilience is anticipated.

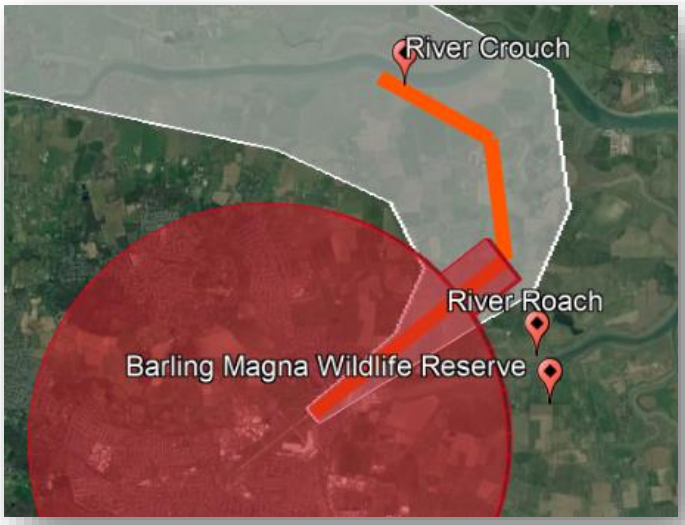
Group	Impact	Qualitative Assessment
	Tranquillity	Aircraft currently overfly the Crouch and Roach Estuaries SPA. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will be very little, if any, increased impact to sites of tranquillity. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option is broadly similar to the Baseline. Limited opportunity for increased capacity or benefit to economic impact is anticipated.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.

Group	Impact	Qualitative Assessment
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns at this stage.

Table 3: D05-NE-B

4.3. D05-NW-A

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly similar communities as the Baseline after take-off.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.

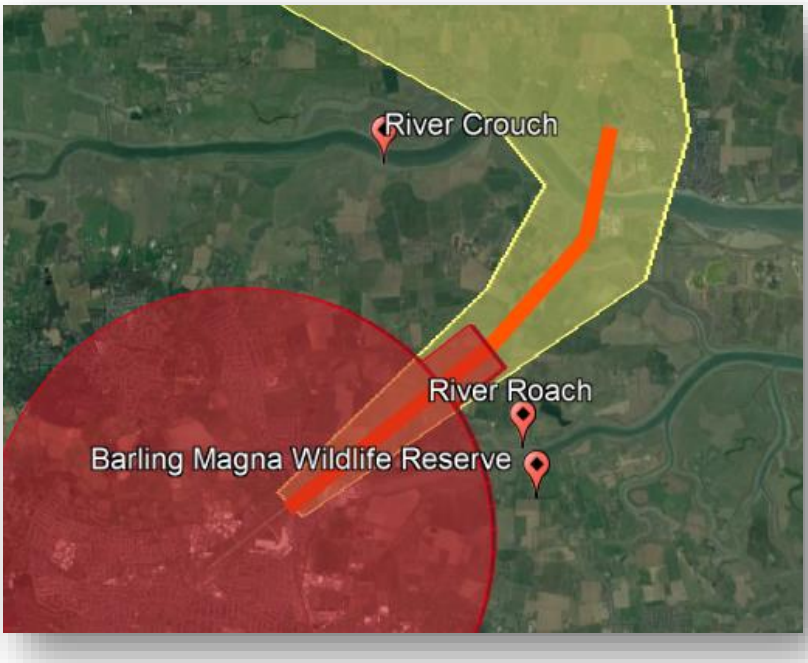
Group	Impact	Qualitative Assessment
	Capacity/ resilience	This option is broadly similar to the Baseline so limited opportunity for increased capacity or resilience is anticipated. There is potential for conflict with current and future London Stansted departures to the East and South which, if not procedurally deconflicted, could further limit capacity and resilience.
	Tranquillity	Aircraft currently overfly the Crouch Estuary SPA. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will be no increased impact to sites of tranquillity. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option is broadly similar to the Baseline. Limited opportunity for increased capacity or benefit to economic impact is anticipated.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.

Group	Impact	Qualitative Assessment
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns at this stage, this option has minimal difference from today's Baseline operation.

Table 4: D05-NW-A

4.4. D05-NW-B

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would initially overfly the same communities as the Baseline after take-off, until the Baseline route turns left. After this point, this design option would overfly different communities to the Baseline. The newly overflown areas have a broadly similar population density compared to those overflown in the Baseline.
	Air Quality	
Wider society	Greenhouse gas impact	Minimal difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.

Group	Impact	Qualitative Assessment
	Capacity/ resilience	This option is broadly similar to the Baseline so limited opportunity for increased capacity or resilience is anticipated. There is potential for conflict with current and future London Stansted departures to the East and the South which if not procedurally deconflicted could further limit capacity and resilience.
	Tranquillity	Aircraft currently overfly the Crouch Estuary SPA. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will be no increased impact to sites of tranquillity. Option D05-NW-B could see a decrease in the impact of overflights on the Crouch Estuary as a smaller portion will be overflow. This swathe crosses the river and then turns towards the Northwest rather than tracking along the river as traffic does in the Baseline. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option is broadly similar to the Baseline. Limited opportunity for increased capacity or benefit to economic impact is anticipated.

Group	Impact	Qualitative Assessment
	Fuel burn	Minimal difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns at this stage.

Table 5: D05-NW-B

4.5. D05-S-A

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly similar communities as the Baseline after take-off.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.

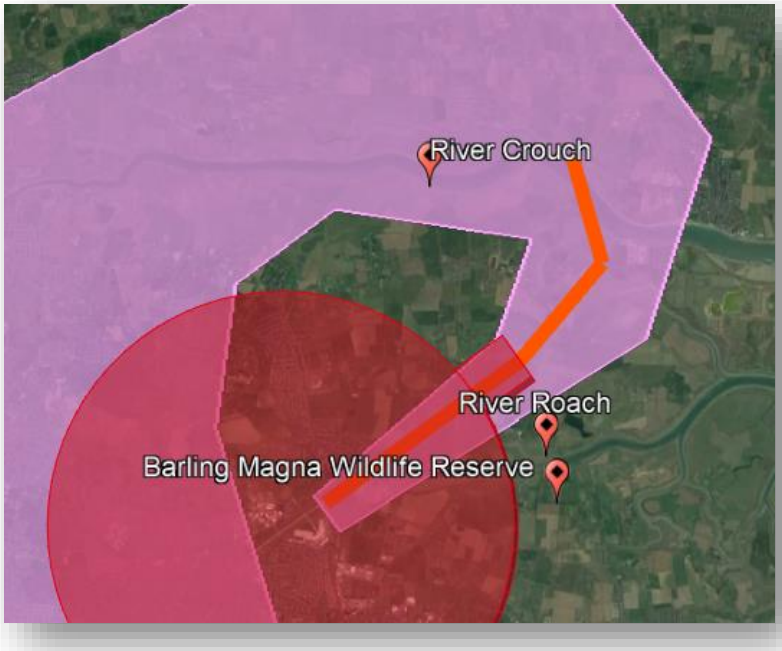
Group	Impact	Qualitative Assessment
	Capacity/ resilience	This option has the potential to improve capacity and resilience due to the right turn out on departure, this would help to keep the traffic free of conflict with London Terminal Manoeuvring Area (LTMA) traffic. Due to the proximity of the Shoeburyness Danger Areas this may not be a viable option for a permanent route, but consideration should be given to its potential as a respite route should the Danger Areas (DA) be closed.
	Tranquillity	Aircraft currently overfly the Roach Estuary SPA and Barling Magna Wildlife Reserve. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will no increased impact to sites of tranquillity as the Baseline falls within this option. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option has the potential to contribute to increased effective capacity which could have a positive economic impact.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.

Group	Impact	Qualitative Assessment
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	Due to the tight turn to the right on departure there is potential for penetration of the Shoeburyness DA. Work would need to be done to ensure the PBN protected area remains clear of the DA. Use of a route inside this swathe would only be available when the DA is not active unless the PBN protective area remains clear of the DA, then no further restrictions would be required.

Table 6: D05-S-A

4.6. D05-S-B

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would initially overfly the same communities as the Baseline after take-off, until the routes turn. After this point, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a lower population density when initially compared to those overflown in the Baseline, although at subsequent higher altitudes the areas would be of a higher population density as aircraft would take a longer route to reach the Thames Estuary.
	Air Quality	
Wider society	Greenhouse gas impact	There would be approximately double the track miles when compared with the Baseline. This could contribute to increased impacts to greenhouse gas and CO^2 emissions.
	Capacity/ resilience	With this option, there is potential for conflict with London City Airport, however, due to the wraparound and additional track miles, the assumption is traffic will be above the London City arrivals, which could contribute to an increase in capacity and resilience.

Group	Impact	Qualitative Assessment
	Tranquillity	Aircraft currently overfly the Roach Estuary SPA. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there could be significant increases of overflight to the Crouch Estuary SPA. Canvey Marshes and Thames Estuary and Marshes would also see a marginal increase; however, traffic is expected to be above 2000ft when overflying these sites due to the extra track miles afforded to this swathe. These areas were not previously overflown. There would be a decrease in impact on the Roach Estuary SPA and Barling Magna Wildlife Reserve from the Baseline. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option could provide positive economic impact due to the increased track miles possibly affording opportunity for Continuous Climb Operations and as such contributing to increased effective capacity. This would have to be assessed in future bilateral sessions and workshops should this option be taken forward.
	Fuel burn	There would be approximately double the track miles when compared with the Baseline. This could contribute to increased impacts to fuel burn.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.

Group	Impact	Qualitative Assessment
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns at this stage.

Table 7: D05-S-B

4.7. D05-S-C

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would initially overfly the same communities as the Baseline after take-off, until the Baseline route turns right. After this point, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a lower population density compared to those overflown in the Baseline with a larger portion of the route over the mouth of the Thames Estuary.
	Air Quality	
Wider society	Greenhouse gas impact	Minimal difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	This option has the potential to improve capacity and resilience due to the right turn out on departure, this would help to keep the traffic free of conflict. There could be a potential reduction in complexity due to the swathe being further away from the LTMA and associated airfields. Due to the proximity of the Shoeburyness DA this may not be a viable option for a permanent route, but consideration should be given to its potential as a respite route should the DA be closed.

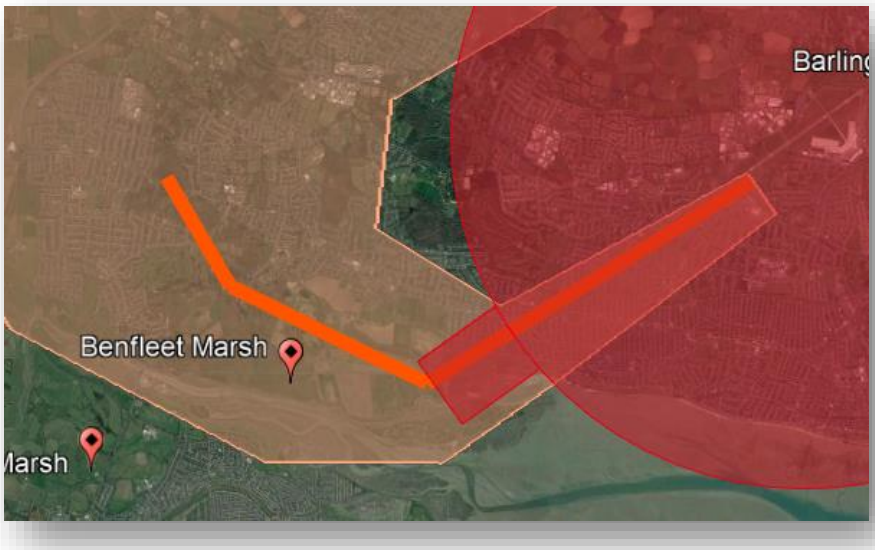
Group	Impact	Qualitative Assessment
	Tranquillity	Aircraft currently overfly the Roach Estuary SPA and Barling Magna Wildlife Reserve. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there may be an increased impact to Wallasea Island and Foulness SPA with this option, however there would be a decrease in impact to the Roach Estuary SPA and Barling Magna Wildlife Reserve. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option has the potential to contribute to increased effective capacity which could have a positive economic impact.
	Fuel burn	Minimal difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.

Group	Impact	Qualitative Assessment
service provider	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	Additional safety work would need to be done to make this a viable option. The entire swathe routes through the Shoeburyness DA. This option could be used as a potential respite route for when the DA are inactive.

Table 8: D05-S-C

5. Initial Options Appraisal – Departures Runway 23

5.1. D23-NE-A

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly similar communities as the Baseline after take-off.
	Air Quality	
Wider society	Greenhouse gas impact	This option contains today's Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	This option contains today's Baseline so limited opportunity for increased capacity or resilience is anticipated.
	Tranquillity	Aircraft currently overfly Benfleet and Canvey Marshes. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will no increased impact to sites of tranquillity as the Baseline falls within this option. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.

Group	Impact	Qualitative Assessment
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option contains today's Baseline so limited opportunity for increased effective capacity or benefit to economic impact is anticipated.
	Fuel burn	This option contains today's Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns at this stage, this option has minimal difference from today's Baseline operation.

Table 9: D23-NE-A

5.2. D23-NE-B

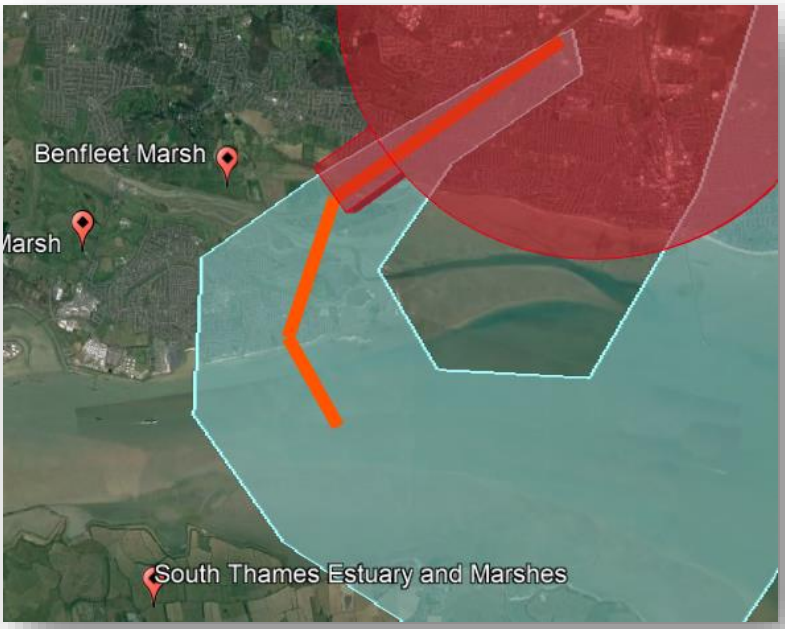
Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would initially overfly the same communities as the Baseline after take-off, until the Baseline route turns right. After this point, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a similar population density compared to those overflown in the Baseline.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	Minimal difference from today's Baseline operation although closer proximity to LTMA traffic, particularly London Stansted and London City, could mean an increase in complexity which could contribute to reduced capacity and resilience, if not procedurally separated.
	Tranquillity	Aircraft currently overfly Benfleet and Canvey Marshes. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will no increased impact to sites of tranquillity with this option from the Baseline. 
General aviation	Access	This option would potentially require an increase in controlled airspace to contain the procedures.
General aviation/ commercial airlines	Economic impact from increased effective capacity	Limited opportunity for increased effective capacity or benefit to economic impact is anticipated.

Group	Impact	Qualitative Assessment
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns at this stage.

Table 10: D23-NE-B

5.3. D23-NE-C

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would initially overfly the same communities as the Baseline after take-off, until the Baseline route turns right. After this point, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a lower population density compared to those overflown in the Baseline as aircraft would fly over part of the Thames Estuary.
	Air Quality	

Group	Impact	Qualitative Assessment
Wider society	Greenhouse gas impact	Extra track miles from today's Baseline operation – approx. double due to the wraparound of this swathe. This could contribute to increased impacts to greenhouse gas and CO^2 emissions.
	Capacity/ resilience	This option has the potential to improve capacity and resilience due to the left turn out on departure, this would help to keep the traffic free of conflict with LTMA traffic. There is the possibility for increased complexity with London Southend arrival traffic due to this option crossing the final approach, although the assumption would be departure traffic would be above this with the increased potential for Continuous Climb Operations (CCO). Due to the proximity of the Shoeburyness DA this may not be a viable option for a permanent route, but consideration should be given to its potential as a respite route should the DA be closed.
	Tranquillity	Aircraft currently overfly Benfleet and Canvey Marshes. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there may be a slight increase in overflight of Canvey Marsh and The South Thames Estuary and Marshes could see an increase where there previously hasn't been any traffic. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.

Group	Impact	Qualitative Assessment
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option has the potential to contribute to increased effective capacity which could have a positive economic impact.
	Fuel burn	Extra track miles from today's Baseline operation – approx. double due to the wraparound of this swathe. This could contribute to increased impacts to fuel burn.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	Due to the tight turn to the left on departure there is potential for penetration of the Shoeburyness DA. Work would need to be done to ensure the IFP protected area remains clear of the DA. Alternatively, use of a route inside this swathe would only be available when the DA are not active.

Table 11: D23-NE-C

5.4. D23-NE-D

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would initially overfly the same communities as the Baseline after take-off, until the Baseline route turns right. After this point, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a lower population density compared to those overflown in the Baseline as aircraft would fly over the Thames Estuary.
	Air Quality	
Wider society	Greenhouse gas impact	Extra track miles from today's Baseline operation – approx. double due to the wraparound of this swathe. This could contribute to increased impacts to greenhouse gas and CO^2 emissions.
	Capacity/ resilience	This option has the potential to improve capacity and resilience due to the left turn out on departure, this would help to keep the traffic free of conflict with LTMA traffic, however it there could be potential for conflict with the current London City point merge should it remain.

Group	Impact	Qualitative Assessment
	Tranquillity	Aircraft currently overfly Benfleet and Canvey Marshes. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there may be a slight increase in overflight of Canvey Marsh and The South Thames Estuary and Marshes could see an increase where there previously hasn't been any traffic. 
General aviation	Access	This option would require an increase in controlled airspace.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option has the potential to contribute to increased effective capacity which could have a positive economic impact.
	Fuel burn	Extra track miles from today's Baseline operation – approximately double due to the wraparound of this swathe. This could contribute to increased impacts to fuel burn.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.

Group	Impact	Qualitative Assessment
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 12: D23-NE-D

5.5. D23-NW-A

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would initially overfly the same communities as the Baseline after take-off, until the route turns right. After this point, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a similar population density compared to those overflown in the Baseline.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	This option is broadly similar to the Baseline so limited opportunity for increased capacity or resilience is anticipated. There is the potential for conflict with London Stansted departures to the East which could mean an increased possibility for step climbs if not procedurally separated, again, there is minimal difference to today's operation so no negative impact on capacity or resilience would be expected.

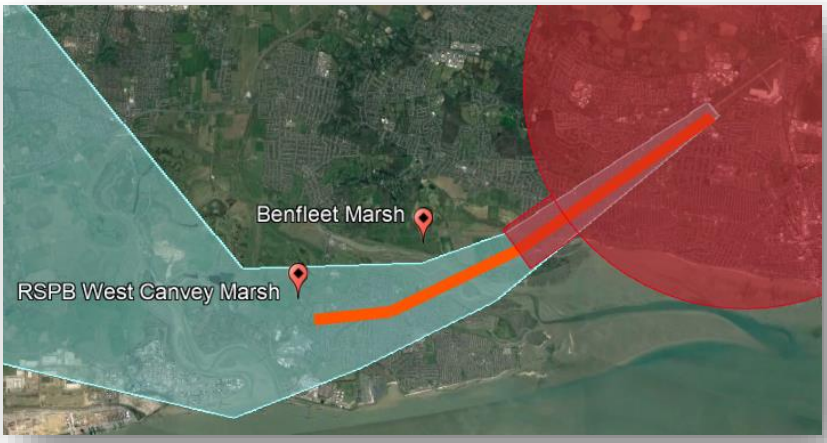
Group	Impact	Qualitative Assessment
	Tranquillity	Aircraft currently overfly Benfleet and Canvey Marshes. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will no increased impact to sites of tranquillity with this option from the Baseline. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option is broadly similar to the Baseline so limited opportunity for increased effective capacity or benefit to economic impact is anticipated.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.

Group	Impact	Qualitative Assessment
service provider	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns at this stage.

Table 13: D23-NW-A

5.6. D23-NW-B

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would initially overfly the same communities as the Baseline after take-off, until the Baseline route turns right. After this point, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a similar population density compared to those overflown in the Baseline.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	Minimal difference from today's Baseline operation although closer proximity to LTMA traffic, particularly London Stansted departures to the South, means we could see an increase in complexity which could contribute to reduced capacity and resilience, if conflicting routes are not procedurally separated.

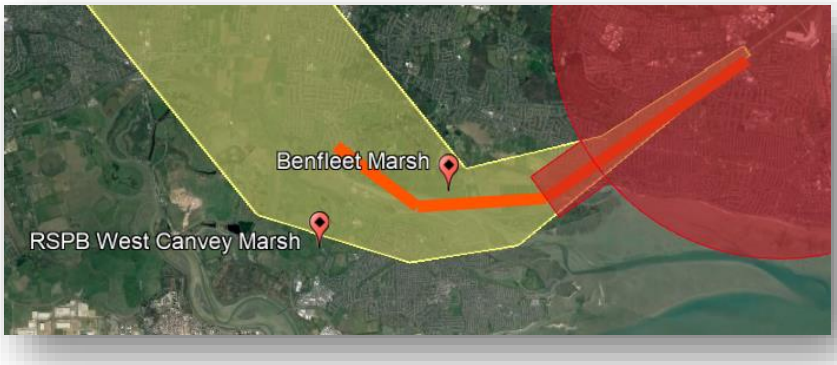
Group	Impact	Qualitative Assessment
	Tranquillity	Aircraft currently overfly Benfleet and Canvey Marshes. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will no increased impact to sites of tranquillity with this option from the Baseline. 
General aviation	Access	Depending on the final track placement there could be a need for some additional controlled airspace due to the lateral dimensions being exceeded.
General aviation/ commercial airlines	Economic impact from increased effective capacity	Limited opportunity for increased effective capacity or benefit to economic impact is anticipated.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.

Group	Impact	Qualitative Assessment
service provider	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns at this stage.

Table 14: D23-NW-B

5.7. D23-NW-C

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly similar communities as the Baseline after take-off.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	This option is the current Baseline so limited opportunity for increased capacity or resilience is anticipated. There is the potential for conflict with London Stansted departures to the East which could mean an increased possibility for step climbs if conflicting routes are not procedurally separated, again, there is minimal difference to today's operation so no negative impact on capacity or resilience would be expected.

Group	Impact	Qualitative Assessment
	Tranquillity	Aircraft currently overfly Benfleet and Canvey Marshes. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will no increased impact to sites of tranquillity with this option from the Baseline. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option is the current Baseline so limited opportunity for increased effective capacity or benefit to economic impact is anticipated.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.

Group	Impact	Qualitative Assessment
service provider	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns at this stage.

Table 15: D23-NW-C

5.8. D23-S-A

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would initially overfly the same communities as the Baseline after take-off, until the route turns left. After this point, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a lower population density compared to those overflown in the Baseline.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	This option is broadly similar to the Baseline so limited opportunity for increased capacity or resilience is anticipated, this option could also conflict with the London City Point Merge, reducing potential capacity if not procedurally separated.

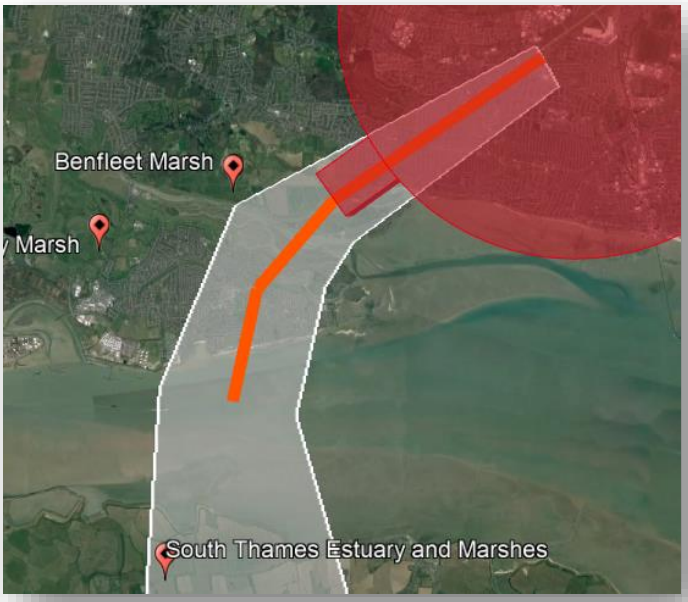
Group	Impact	Qualitative Assessment
	Tranquillity	Aircraft currently overfly Benfleet and Thames Estuary and Marshes. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will no increased impact to sites of tranquillity with this option from the Baseline. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option is broadly similar to the Baseline so limited opportunity for increased effective capacity or benefit to economic impact is anticipated.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.

Group	Impact	Qualitative Assessment
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns at this stage.

Table 16: D23-S-A

5.9. D23-S-B

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly similar communities as the Baseline after departure.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	This option is the current Baseline so limited opportunity for increased capacity or resilience is anticipated.

Group	Impact	Qualitative Assessment
	Tranquillity	Aircraft currently overfly Benfleet and Thames Estuary and Marshes. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will no increased impact to sites of tranquillity with this option from the Baseline. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option is the current Baseline so limited opportunity for increased effective capacity or benefit to economic impact is anticipated.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.

Group	Impact	Qualitative Assessment
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns at this stage.

Table 17: D23-S-B

5.10. D23-S-C

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would initially overfly the same communities as the Baseline after take-off, until the Baseline route turns left. After this point, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a higher population density compared to those overflown in the Baseline.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	This option would move the departures for this runway and direction closer to the LTMA and London Gatwick traffic, which could contribute to a reduction in capacity and resilience reducing potential capacity if not procedurally separated.

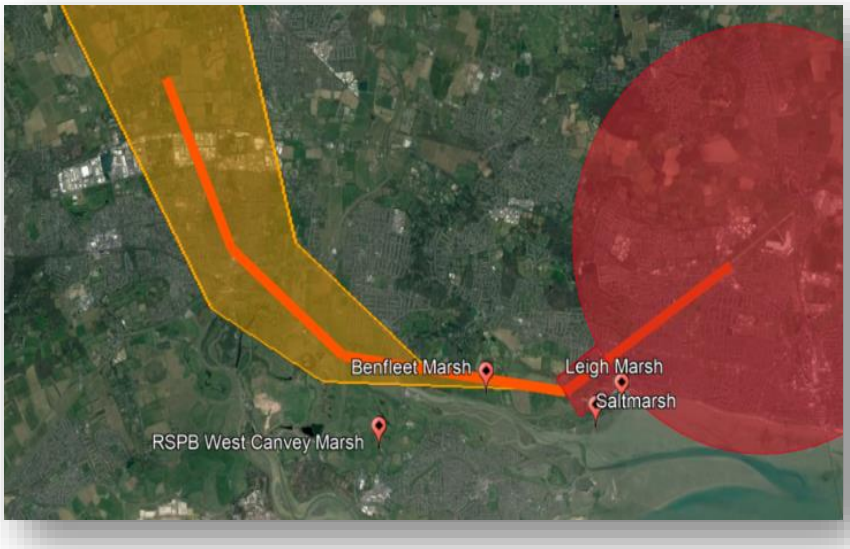
Group	Impact	Qualitative Assessment
	Tranquillity	Aircraft currently overfly Benfleet and Thames Estuary and Marshes. Using our 6NM assessment track (to establish where aircraft will be below 2000ft) we can see that there may be a slight increased impact to the Canvey Marshes with this option, but a decrease in impact to the Thames Estuary and Marshes. 
General aviation	Access	This option would potentially require a slight increase in controlled airspace to contain the procedures. Further assessment in Stage 3 to understand the additional volume of controlled airspace required.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option is broadly similar to the Baseline so limited opportunity for increased effective capacity or benefit to economic impact is anticipated.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.

Group	Impact	Qualitative Assessment
service provider	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 18: D23-S-C

6. Initial Options Appraisal – Arrivals Runway 05

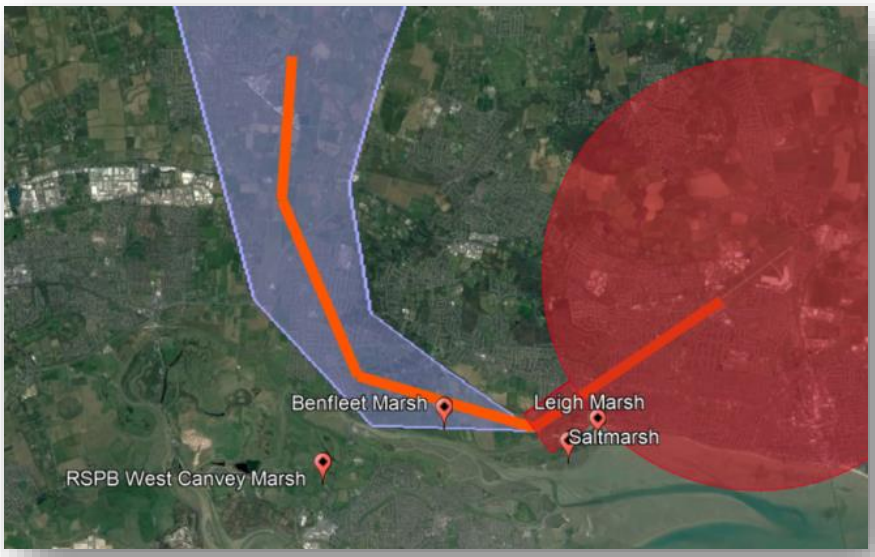
6.1. A05-NW-A

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a similar population density compared to those overflown in the Baseline.
	Air Quality	
Wider society	Greenhouse gas impact	A slight reduction in track miles between this option and the Baseline. Some benefits to greenhouse gas and CO^2 emissions could be anticipated.
	Capacity/ resilience	This option could see potential complexity issues with network connectivity and proximity to LTMA traffic, specifically London Stansted and London City, but there would be minimal difference to today's operation. There would be little opportunity for any increase in capacity or resilience reducing potential capacity if not procedurally separated.
	Tranquillity	The Baseline for this option currently overflies Canvey and Benfleet Marshes. Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there would be no obvious increase in the sites of tranquillity overflown with this option. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.

Group	Impact	Qualitative Assessment
General aviation/ commercial airlines	Economic impact from increased effective capacity	There is minimal difference between this option and the current Baseline so limited opportunity for increased effective capacity or benefit to economic impact is anticipated.
	Fuel burn	A slight reduction in track miles between this option and the Baseline. Some benefits to fuel burn could be anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 19: A05-NW-A

6.2. A05-NW-B

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a similar population density compared to those overflown in the Baseline.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	This option could see potential complexity issues with network connectivity and proximity to LTMA traffic, specifically London Stansted, but there would be minimal difference to today's operation. There would be little opportunity for any increase in capacity or resilience unless conflicting routes were procedurally separated.
	Tranquillity	The Baseline for this option currently overflies Canvey and Benfleet Marshes. Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there would be no obvious increase in the sites of tranquillity overflown with this option. We could even see a reduction in flights over Canvey Marshes. 

Group	Impact	Qualitative Assessment
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option would provide limited opportunity for increased effective capacity or benefit to economic impact.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 20: A05-NW-B

6.3. A05-NW-C

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a similar population density compared to those overflown in the Baseline.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline if anything there may be a slight reduction. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	Currently, there are not many arrivals from this direction, so the Baseline (do nothing option) falls within this swathe. There is the potential for interactions with LTMA traffic, specifically London Stansted and London City traffic therefore, little opportunity for increased capacity or resilience is anticipated unless conflicting routes are procedurally separated.
	Tranquillity	The Baseline for this option currently overflies Canvey and Benfleet Marshes. Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there would be no obvious increase in the sites of tranquillity overflown with this option. We could even see a reduction in flights over both Canvey and Benfleet Marshes. 

Group	Impact	Qualitative Assessment
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option would provide limited opportunity for increased effective capacity or benefit to economic impact.
	Fuel burn	Little to no difference in track miles between this option and the Baseline if anything there may be a slight reduction. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 21: A05-NW-C

6.4. A05-NW-D

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a lower population density compared to those overflown in the Baseline with aircraft also flying over part of the Thames Estuary.
	Air Quality	
Wider society	Greenhouse gas impact	This option would mean aircraft are flying a more direct route to the final approach, which would mean a reduction in track miles from today's Baseline option. There could potentially be significant benefits and impacts to greenhouse gas and CO^2 emissions should aircraft be able to receive a Continuous Descent Arrival (CDA).
	Capacity/ resilience	This option could see potential complexity issues with network connectivity and proximity to LTMA traffic, specifically the potential for multiple interactions with both current and future London Stansted departures to the East. There would be little opportunity for any increase in capacity or resilience, which could end up being reduced.
	Tranquillity	The Baseline for this option currently overflies Canvey and Benfleet Marshes. Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there would be no obvious increase in the sites of tranquillity overflown with this option. 

Group	Impact	Qualitative Assessment
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option would provide limited opportunity for increased effective capacity or benefit to economic impact.
	Fuel burn	This option would mean aircraft are flying a more direct route to the final approach, which would mean a reduction in track miles from today's Baseline option. There could potentially be significant benefits to fuel burn should aircraft be able to receive a CDA however, this is unlikely due to potential interactions.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 22: A05-NW-D

6.5. A05-SE-A

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a lower population density compared to those overflown in the Baseline at lower altitudes as aircraft would fly over the Thames Estuary, although at higher altitudes area of higher population density would be overflown. High Weald Area of Outstanding Natural Beauty (AONB) would also be overflown at higher altitudes.
	Air Quality	
Wider society	Greenhouse gas impact	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There would be potential for benefits to both greenhouse gas and CO^2 emissions.
	Capacity/ resilience	Potential for more interactions with LTMA traffic, specifically London City and London Gatwick current procedures. However, this is a shorter more expeditious route avoiding the extra track miles and proximity to the Shoeburyness DA. On balance minimal impact upon capacity and resilience is anticipated.

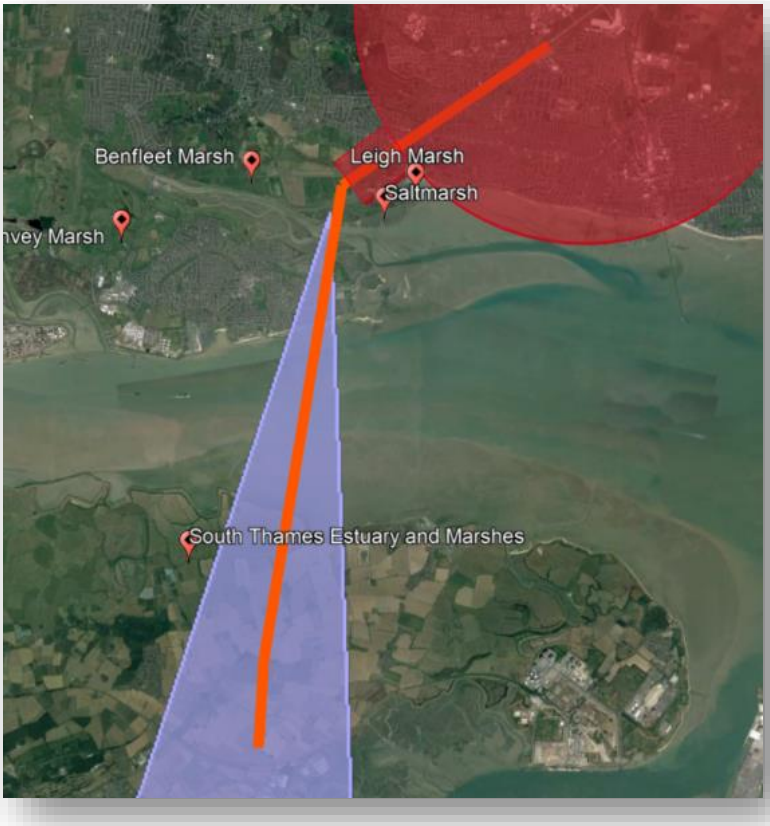
Group	Impact	Qualitative Assessment
	Tranquillity	The Baseline for this option currently overflies Canvey and Benfleet Marshes. Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there would potentially be a reduction in overflight of Canvey Marsh, but the Thames Estuary and Marshes could see an increase. Overall, there could be a slight increase in impact to sites of tranquillity overflown with this option as the flight paths will cross the Thames estuary at low level. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option would provide limited opportunity for increased effective capacity or benefit to economic impact.
	Fuel burn	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There could be potential for benefits to fuel burn, which could be even greater should CDAs be available.

Group	Impact	Qualitative Assessment
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 23: A05-SE-A

6.6. A05-SE-B

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a lower population density compared to those overflown in the Baseline at lower altitudes as aircraft would fly over the Thames Estuary, although at higher altitudes area of higher population density would be overflown.
	Air Quality	
Wider society	Greenhouse gas impact	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There would be potential for benefits to both greenhouse gas and CO^2 emissions.
	Capacity/ resilience	Potential for more interactions with LTMA traffic, specifically London City. However, this is a shorter more expeditious route avoiding the extra track miles and proximity to the Shoeburyness DA so there is potential for increased capacity and resilience is anticipated.

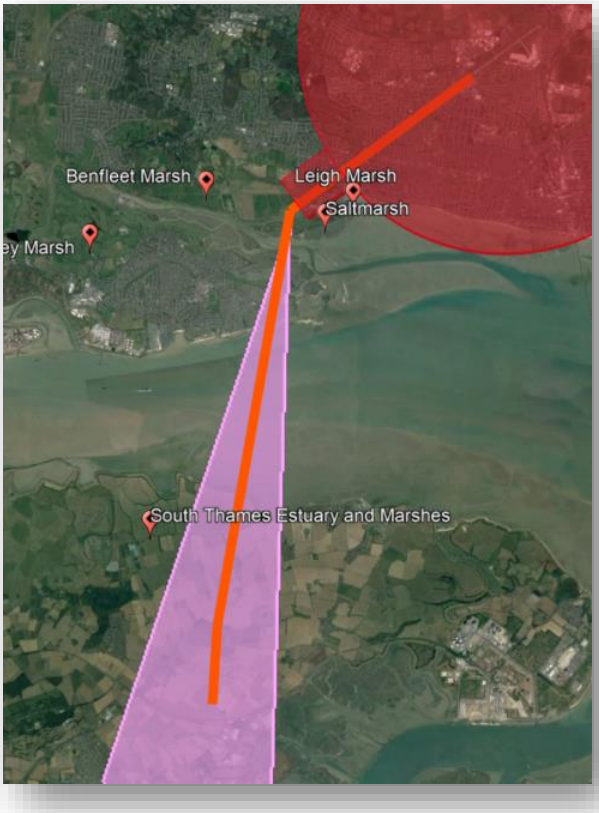
Group	Impact	Qualitative Assessment
	Tranquillity	The Baseline for this option currently overflies Canvey and Benfleet Marshes. Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there would potentially be a reduction in overflight of Canvey Marsh, but the Thames Estuary and Marshes could see an increase. Overall, there could be a slight increase in impact to sites of tranquillity overflown with this option as the flight paths will cross the Thames estuary at low level. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option has the potential to contribute to increased effective capacity which could have a positive economic impact.

Group	Impact	Qualitative Assessment
	Fuel burn	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There could be potential for benefits fuel burn, which could be even greater should CDAs be available.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 24: A05-SE-B

6.7. A05-SE-C

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a lower population density compared to those overflown in the Baseline at lower altitudes as aircraft would fly over the Thames Estuary, although at higher altitudes area of similar population density would be overflown. Kent Downs AONB would also be overflown at higher altitudes.
	Air Quality	
Wider society	Greenhouse gas impact	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There would be potential for benefits to both greenhouse gas and CO^2 emissions.
	Capacity/ resilience	This option is tactically achieved in today's operation but only when deconflicted from LTMA departing traffic to the Southeast. It may be a viable option if arrivals were underneath the London City point merge. This is a shorter more expeditious route avoiding the extra track miles and proximity to the Shoeburyness DA so there is potential for increased capacity and resilience is anticipated.

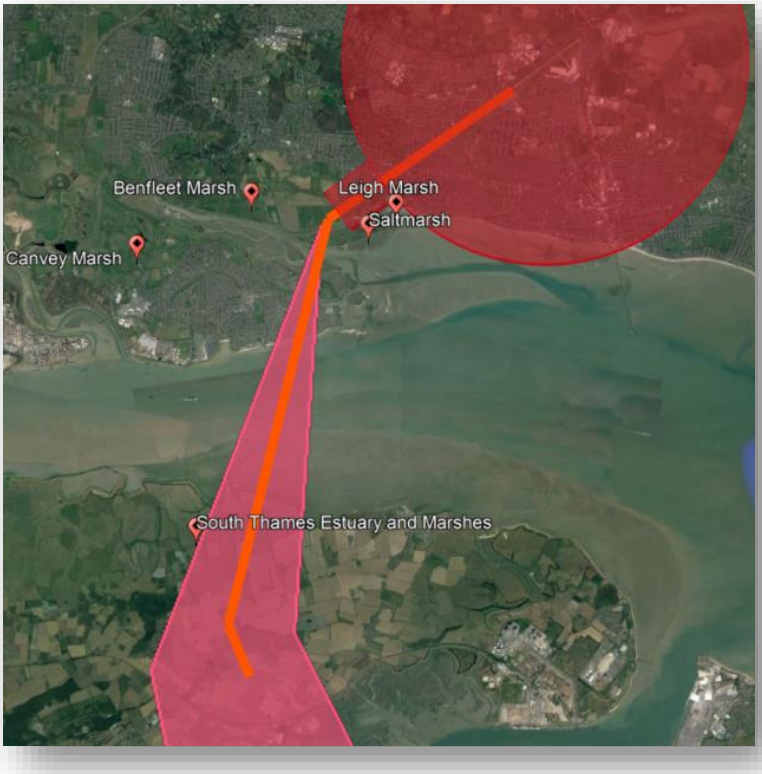
Group	Impact	Qualitative Assessment
	Tranquillity	The Baseline for this option currently overflies Canvey and Benfleet Marshes. Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there would potentially be a reduction in overflight of Canvey Marsh, but the Thames Estuary and Marshes could see an increase. Overall, there could be a slight increase in impact to sites of tranquillity overflown with this option as the flight paths will cross the Thames Estuary at low level. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option has the potential to contribute to increased effective capacity which could have a positive economic impact.

Group	Impact	Qualitative Assessment
	Fuel burn	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There could be potential for benefits to fuel burn, which could be even greater should CDAs be available.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 25: A05-SE-C

6.8. A05-SE-D

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a lower population density compared to those overflown in the Baseline at lower altitudes as aircraft would fly over the Thames Estuary, although at higher altitudes area of similar population density would be overflown.
	Air Quality	
Wider society	Greenhouse gas impact	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There would be potential for benefits to both greenhouse gas and CO^2 emissions.
	Capacity/ resilience	This option would need deconflicting from the current London City point merge. This is a shorter more expeditious route avoiding the extra track miles and proximity to the Shoeburyness DA so there is potential for increased capacity and resilience is anticipated.

Group	Impact	Qualitative Assessment
	Tranquillity	The Baseline for this option currently overflies Canvey and Benfleet Marshes. Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there would potentially be a reduction in overflight of Canvey Marsh, but the Thames Estuary and Marshes could see an increase. Overall, there could be a slight increase in impact to sites of tranquillity overflown with this option as the flight paths will cross the Thames estuary at low level. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option has the potential to contribute to increased effective capacity which could have a positive economic impact.
	Fuel burn	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There could be potential for benefits to fuel burn, which could be even greater should CDAs be available.

Group	Impact	Qualitative Assessment
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 26: A05-SE-D

6.9. A05-SE-E

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a lower population density compared to those overflown in the Baseline as aircraft would fly over the Thames Estuary and English Channel.
	Air Quality	
Wider society	Greenhouse gas impact	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There would be potential for benefits to both greenhouse gas and CO^2 emissions.

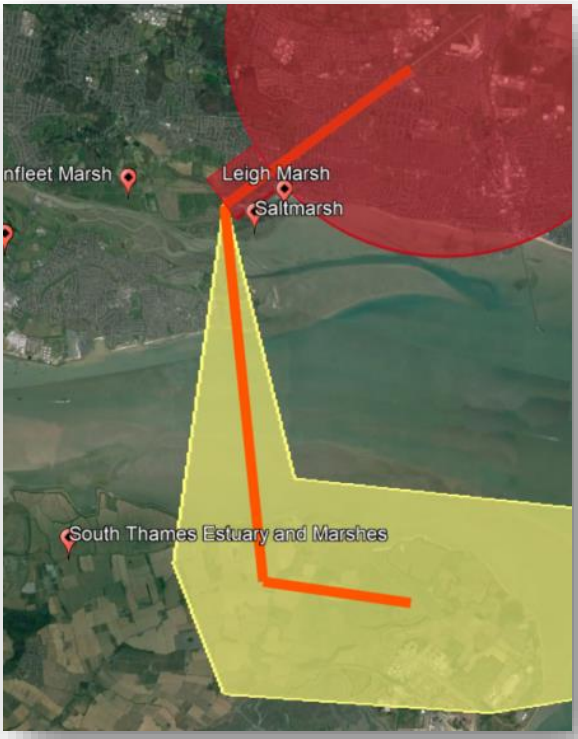
Group	Impact	Qualitative Assessment
	Capacity/ resilience	There are few foreseen issues with LTMA traffic, potentially this option would need deconflicting from the current London City point merge. It is also a shorter more expeditious route than the Baseline so it is expected that capacity and resilience would be increased with this option there.
	Tranquillity	The Baseline for this option currently overflies Canvey and Benfleet Marshes. Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there would potentially be a reduction in overflight of Canvey Marsh, but the Thames Estuary and Marshes could see an increase. Overall, there could be a slight increase in impact to sites of tranquillity overflown with this option as the flight paths will cross the Thames estuary at low level. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.

Group	Impact	Qualitative Assessment
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option has the potential to contribute to increased effective capacity which could have a positive economic impact.
	Fuel burn	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There could be potential for benefits to fuel burn, which could be even greater should CDAs be available.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 27: A05-SE-E

6.10. A05-SE-F

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a lower population density compared to those overflown in the Baseline as aircraft would fly over the Thames Estuary.
	Air Quality	
Wider society	Greenhouse gas impact	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There would be potential for benefits to both greenhouse gas and CO^2 emissions.
	Capacity/ resilience	There are few foreseen issues with LTMA traffic, potentially this option would need deconflicting from the current London City point merge. It is a similar route to today's Baseline so no anticipated benefit to capacity or resilience is anticipated.

Group	Impact	Qualitative Assessment
	Tranquillity	The Baseline for this option currently overflies Canvey and Benfleet Marshes. Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there would potentially be a reduction in overflight of Canvey Marsh, but the Thames Estuary and Marshes could see an increase. Overall, there could be a slight increase in impact to sites of tranquillity overflown with this option as the flight paths will cross the Thames estuary at low level. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option would provide limited opportunity for increased effective capacity or benefit to economic impact.
	Fuel burn	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There could be potential for benefits to fuel burn, which could be even greater should CDAs be available.

Group	Impact	Qualitative Assessment
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 28: A05-SE-F

6.11. A05-SE-G

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly similar communities as the Baseline on approach.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	Currently today's Baseline option so little opportunity for increased capacity or resilience would be expected.

Group	Impact	Qualitative Assessment
	Tranquillity	The Baseline for this option currently overflies Canvey and Benfleet Marshes. Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will be very little, if any, increased impact to sites of tranquillity. We could even see a reduction in flights over both Canvey and Benfleet Marshes. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option would provide limited opportunity for increased effective capacity or benefit to economic impact.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.

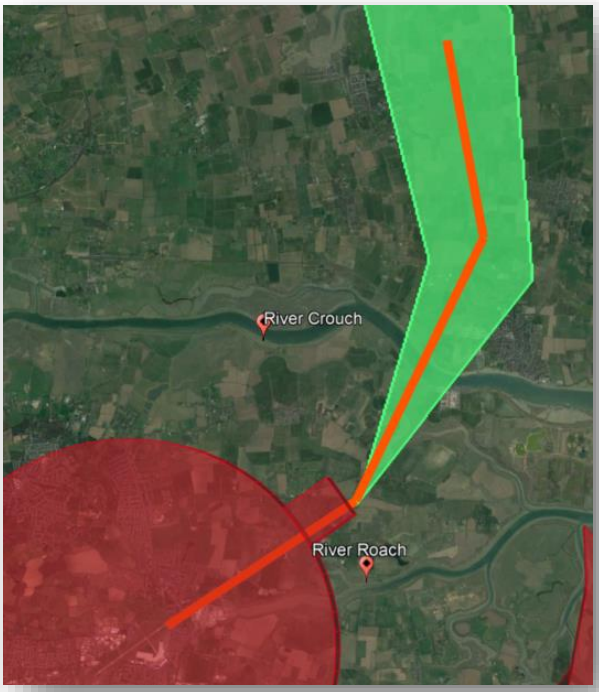
Group	Impact	Qualitative Assessment
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 29: A05-SE-G

7. Initial Options Appraisal – Arrivals Runway 23

7.1. A23-NW-A

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a similar population density compared to those overflown in the Baseline.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	This option is minimally different to today's Baseline option so little opportunity for increased capacity or resilience would be expected. Deconfliction from London City and London Stansted traffic would be required.

Group	Impact	Qualitative Assessment
	Tranquillity	The Baseline for this option currently overflies the Crouch and Blackwater Estuaries. Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will be very little, if any, increased impact to sites of tranquillity. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option would provide limited opportunity for increased effective capacity or benefit to economic impact.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.

Group	Impact	Qualitative Assessment
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 30: A23-NW-A

7.2. A23-NW-B

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a similar population density compared to those overflown in the Baseline.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	This option is minimally different to today's Baseline option so little opportunity for increased capacity or resilience would be expected. Deconfliction from London City and London Stansted traffic would be required.

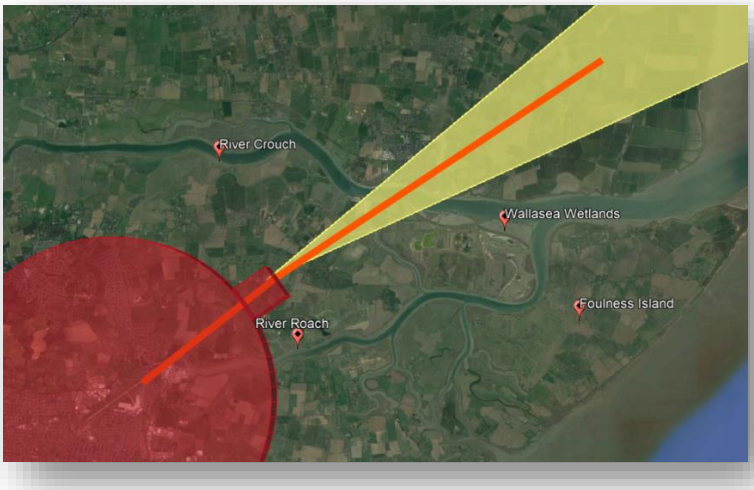
Group	Impact	Qualitative Assessment
	Tranquillity	The Baseline for this option currently overflies the Crouch and Blackwater Estuaries. Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will be very little, if any, increased impact to sites of tranquillity. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option would provide limited opportunity for increased effective capacity or benefit to economic impact.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.

Group	Impact	Qualitative Assessment
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 31: A23-NW-B

7.3. A23-SE-A

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly similar communities as the Baseline on approach.
	Air Quality	
Wider society	Greenhouse gas impact	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to greenhouse gas and CO^2 emissions are anticipated.
	Capacity/ resilience	This option is currently to today's Baseline option so little opportunity for increased capacity or resilience would be expected.

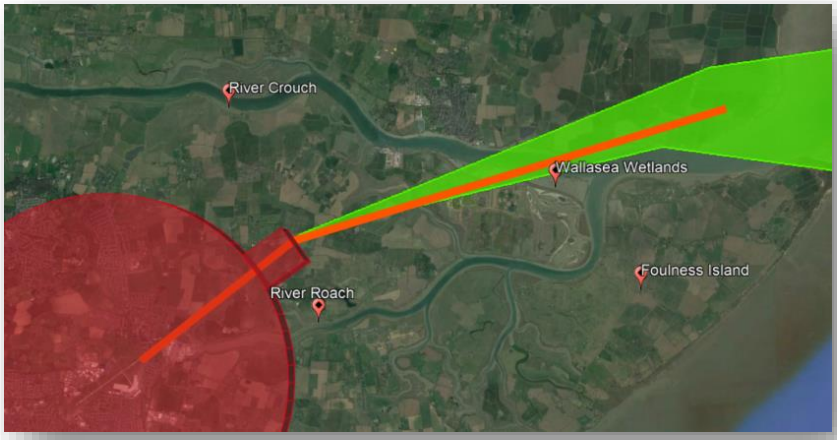
Group	Impact	Qualitative Assessment
	Tranquillity	The Baseline for this option currently overflies the Crouch and Roach Estuaries and the Dengie Nature Reserve (although at a high altitude). Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there will be very little, if any, increased impact to sites of tranquillity 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option would provide limited opportunity for increased effective capacity or benefit to economic impact.
	Fuel burn	Little to no difference in track miles between this option and the Baseline. No significant benefits or impacts to fuel burn are anticipated.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.

Group	Impact	Qualitative Assessment
service provider	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	No initial safety concerns with this option.

Table 32: A23-SE-A

7.4. A23-SE-B

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a similar population density compared to those overflown in the Baseline.
	Air Quality	
Wider society	Greenhouse gas impact	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There would be potential for benefits to both greenhouse gas and CO^2 emissions.
	Capacity/ resilience	There are no foreseen issues with LTMA traffic with this option, it is a similar route, although slight shorter, to today's Baseline so minimal benefits to capacity or resilience may be possible.

Group	Impact	Qualitative Assessment
	Tranquillity	The Baseline for this option currently overflies the Crouch and Roach Estuaries and the Dengie Nature Reserve (although at a high altitude). Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there could be a potential increase in traffic over Wallasea Island. Overall, there could be a slight increase in impact to sites of tranquillity overflown with this option. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option could provide some opportunity for increased effective capacity or benefit to economic impact.
	Fuel burn	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There could be potential for benefits to fuel burn, which could be even greater should CDAs be available.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.

Group	Impact	Qualitative Assessment
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	Additional safety work would need to be done to make this a viable option. The entire swathe routes through the Shoeburyness DA. This option could be used as a potential respite route for when the DA are inactive.

Table 33: A23-SE-B

7.5. A23-SE-C

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a similar population density compared to those overflown in the Baseline at lower altitudes, although some population would be overflown at higher altitudes whereas the Baseline route is over the English Channel at this point.
	Air Quality	
Wider society	Greenhouse gas impact	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There would be potential for benefits to both greenhouse gas and CO^2 emissions.
	Capacity/ resilience	There are no foreseen issues with LTMA traffic with this option, it is a slightly shorter route to today's Baseline so minimal benefits to capacity or resilience may be possible.

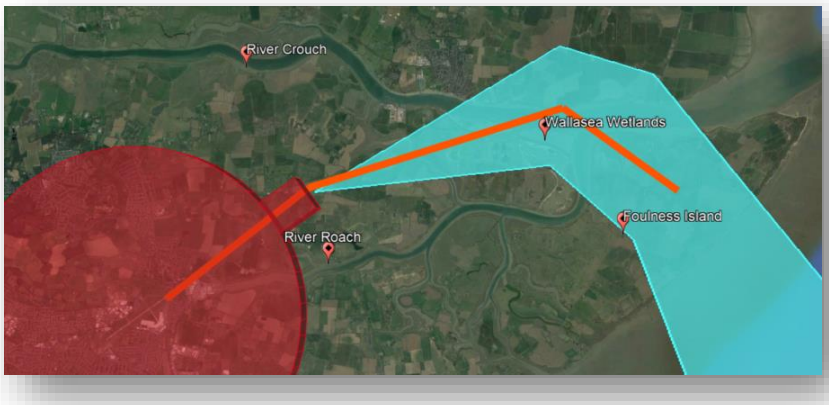
Group	Impact	Qualitative Assessment
	Tranquillity	The Baseline for this option currently overflies the Crouch and Roach Estuaries and the Dengie Nature Reserve (although at a high altitude). Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there could be a potential increase in traffic over Wallasea Island. Overall, there could be a slight increase in impact to sites of tranquillity overflown with this option. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option could provide some opportunity for increased effective capacity or benefit to economic impact.
	Fuel burn	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There could be potential for benefits to fuel burn, which could be even greater should CDAs be available.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.

Group	Impact	Qualitative Assessment
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	Additional safety work would need to be done to make this a viable option. The entire swathe routes through the Shoeburyness DA. This option could be used as a potential respite route for when the DA are inactive.

Table 34: A23-SE-C

7.6. A23-SE-D

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a similar population density compared to those overflown in the Baseline at lower altitudes, although some population would be overflown at higher altitudes whereas the Baseline route is over the English Channel at this point.
	Air Quality	
Wider society	Greenhouse gas impact	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There would be potential for benefits to both greenhouse gas and CO^2 emissions.
	Capacity/ resilience	There are no foreseen issues with LTMA traffic with this option, it is also a shorter, more expeditious route to today's Baseline so benefits to capacity or resilience may be possible.

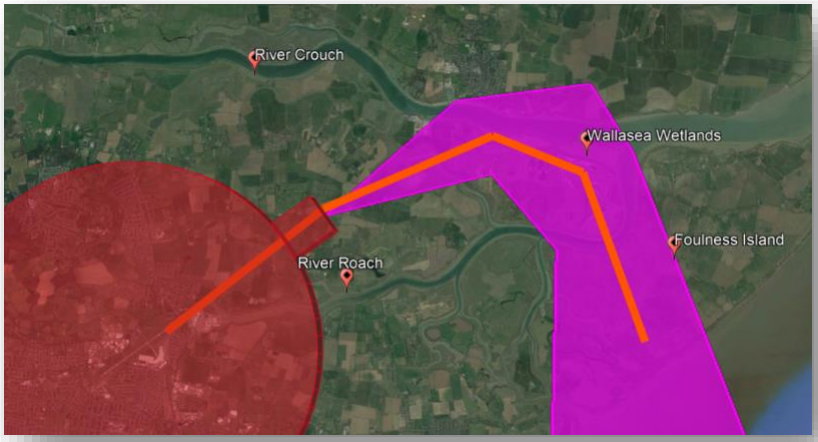
Group	Impact	Qualitative Assessment
	Tranquillity	The Baseline for this option currently overflies the Crouch and Roach Estuaries and the Dengie Nature Reserve (although at a high altitude). Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there could be a potential increase in traffic over Wallasea Island and the Foulness SPA. Overall, there could be a slight increase in impact to sites of tranquillity overflown with this option. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	This option could provide opportunity for increased effective capacity or benefit to economic impact.
	Fuel burn	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There could be potential for benefits to fuel burn, which could be even greater should CDAs be available.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.

Group	Impact	Qualitative Assessment
service provider	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	Additional safety work would need to be done to make this a viable option. The entire swathe routes through the Shoeburyness DA. This option could be used as a potential respite route for when the DA are inactive.

Table 35: A23-SE-D

7.7. A23-SE-E

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overly different communities to the Baseline. The newly overflown areas would generally be of a similar population density compared to those overflown in the Baseline at lower altitudes, although some population would be overflown at higher altitudes whereas the Baseline route is over the English Channel at this point.
	Air Quality	
Wider society	Greenhouse gas impact	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There would be potential for benefits to both greenhouse gas and CO^2 emissions.
	Capacity/ resilience	There is potential for conflictions with LTMA departure traffic with this option, however, it is also a shorter, more expeditious route to today's Baseline so some benefits to capacity or resilience may be possible.

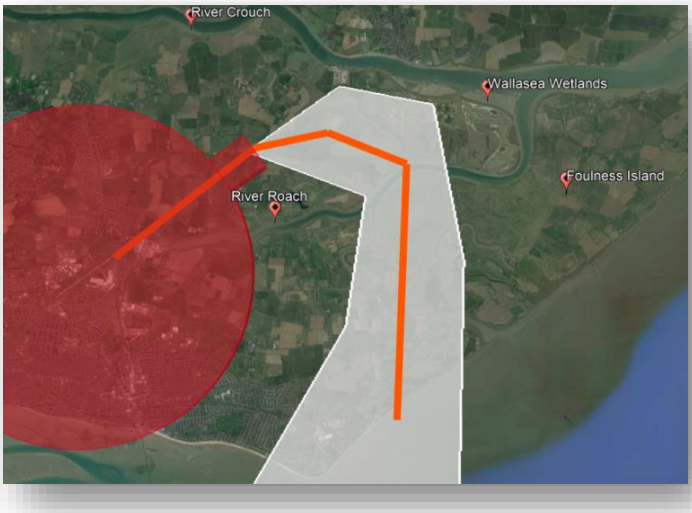
Group	Impact	Qualitative Assessment
	Tranquillity	The Baseline for this option currently overflies the Crouch and Roach Estuaries and the Dengie Nature Reserve (although at a high altitude). Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there could be an increase in traffic over Wallasea Island and Wetlands and the Foulness SPA. Tracks over the Crouch Estuary would decrease but the Roach Estuary could see an increase in disturbance. Overall, there could be an increase in impact to sites of tranquillity overflown at low level with this option. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	There is potential for this option to provide opportunity for increased effective capacity or benefits to economic impact.
	Fuel burn	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There could be potential for benefits to fuel burn, which could be even greater should CDAs be available.
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.

Group	Impact	Qualitative Assessment
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	There is potential for conflictions with LTMA departure traffic with this option, however, it is also a shorter, more expeditious route to today's Baseline so some benefits to capacity or resilience may be possible.

Table 36: A23-SE-E

7.8. A23-SE-F

Group	Impact	Qualitative Assessment
Communities	Noise impact on health and quality of life	This design option would overfly the same communities as the Baseline for the final stage of the approach (within 5 km of touchdown). Before that, this design option would overfly different communities to the Baseline. The newly overflown areas would generally be of a similar population density compared to those overflown in the Baseline at lower altitudes, although some population would be overflown at higher altitudes whereas the Baseline route is over the English Channel at this point.
	Air Quality	
Wider society	Greenhouse gas impact	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There would be potential for benefits to both greenhouse gas and CO^2 emissions.

Group	Impact	Qualitative Assessment
	Capacity/ resilience	There is potential for conflictions with LTMA departure traffic and the close proximity to London Gatwick with this option. However, it is also a shorter, more expeditious route to today's Baseline. On balance some benefits to capacity or resilience may be possible.
	Tranquillity	The Baseline for this option currently overflies the Crouch and Roach Estuaries and the Dengie Nature Reserve (although at a high altitude). Using our 10NM assessment track (to establish where aircraft will be below 2000ft) we can see that there could be an increase in traffic over the Roach Estuary, but a decrease in flights over the Crouch Estuary. Wallasea Island and Foulness SPA would not be affected with this option. Overall, there could be a decrease in impact to sites of tranquillity overflown at low level with this option. 
General aviation	Access	No increase or reduction in controlled airspace is anticipated for this option.
General aviation/ commercial airlines	Economic impact from increased effective capacity	There is potential for this option to provide some opportunity for increased effective capacity or benefits to economic impact.
	Fuel burn	This option would mean aircraft are flying a more direct route to the final approach and as such would all see a reduction in track miles from today's Baseline option. There could be potential for benefits to fuel burn, which could be even greater should CDAs be available.

Group	Impact	Qualitative Assessment
Commercial airlines	Training costs	No additional training costs for airlines are anticipated with this option. Updates to flight procedures form part of an AIRAC cycle where airlines will update their procedures and utilise training if deemed necessary as standard.
	Other costs	No other commercial airline costs are anticipated with the initial deployment of this option.
Airport/ Air navigation service provider	Infrastructure costs	No infrastructure costs are anticipated with the initial deployment of this option for either the Airport or ANSP.
	Operational costs	No operational costs are anticipated with the initial deployment of this option for either the Airport or the ANSP. This option contributes to the VOR rationalisation currently ongoing within the UK as it removes reliance on ground based navigational aids with the implementation of PBN. This will contribute towards a reduction for the ANSP in operational costs.
	Deployment costs	It is anticipated that controller and assistant training will be required for the initial deployment of this option. The scope and scale of this training requirement will be assessed further during the Stage 3 Full Options Appraisal.
All	Safety	Additional safety work would need to be done to make this a viable option. The majority of the swathe routes through the Shoeburyness DA. This option could be used as a potential respite route for when the DA are inactive, or a potential route missing the DA confines, subject to PBN requirements.

Table 37: A23-SE-F

8. Conclusion

8.1. Methodology

8.1.1. The tables contained in this section provide a summary assessment of the net impacts/benefits for each option against each of the categories in our initial options appraisal. All our analysis has been qualitative and there are some categories that require further analysis at later stages of this ACP. The options have been assessed as to whether there is potential for an overall net benefit, no benefit or impact and overall net impact, they are colour coded as per the table below:

Qualitatively assessed as having potential for an overall net benefit	
Qualitatively assessed as having neither impact nor benefit	
Qualitatively assessed as having potential for an overall net impact	

Table 38: IOA Summary Key

8.1.2. Where options are not being progressed to Stage 3, the rationale behind the decision is contained below the table. The assessments and decisions on which options we take forward at this stage have been done in a qualitative manor in keeping with the approach to this Initial Options Appraisal.

8.2. Departures Runway 05

Northeast

Group	Impact	D05-NE-A	D05-NE-B
Communities	Noise impact on health and quality of life		
	Air Quality		
Wider society	Greenhouse gas impact		
	Capacity/ resilience		
	Tranquillity		
General aviation	Access		

Group	Impact	D05-NE-A	D05-NE-B
General aviation/ commercial airlines	Economic impact from increased effective capacity		
	Fuel burn		
Commercial airlines	Training costs		
	Other costs		
Airport/ Air navigation service provider	Infrastructure costs		
	Operational costs		
	Deployment costs		
All	Safety		
Option taken forward to Stage 3		Yes	Yes

Table 39: Runway 05 - Northeast - IOA Summary

Northwest

Group	Impact	D05-NW-A	D05-NW-B
Communities	Noise impact on health and quality of life		
	Air Quality		
Wider society	Greenhouse gas impact		
	Capacity/ resilience		
	Tranquillity		
General aviation	Access		

Group	Impact	D05-NW-A	D05-NW-B
General aviation/ commercial airlines	Economic impact from increased effective capacity		
	Fuel burn		
Commercial airlines	Training costs		
	Other costs		
Airport/ Air navigation service provider	Infrastructure costs		
	Operational costs		
	Deployment costs		
All	Safety		
Option taken forward to Stage 3		Yes	Yes

Table 40: Runway 05 - Northwest - IOA Summary

South/Southeast

Group	Impact	D05-S-A	D05-S-B	D05-S-C
Communities	Noise impact on health and quality of life			
	Air Quality			
Wider society	Greenhouse gas impact			
	Capacity/ resilience			
	Tranquillity			
General aviation	Access			

Group	Impact	D05-S-A	D05-S-B	D05-S-C
General aviation/ commercial airlines	Economic impact from increased effective capacity			
	Fuel burn			
Commercial airlines	Training costs			
	Other costs			
Airport/ Air navigation service provider	Infrastructure costs			
	Operational costs			
	Deployment costs			
All	Safety			
Option taken forward to Stage 3		Yes	Yes	Yes

Table 41: Runway 05 - South/Southeast - IOA Summary

8.3. Departures Runway 23

Northeast

Group	Impact	D23-NE-A	D23-NE-B	D23-NE-C	D23-NE-D
Communities	Noise impact on health and quality of life				
	Air Quality				
Wider society	Greenhouse gas impact				
	Capacity/ resilience				
	Tranquillity				

Group	Impact	D23-NE-A	D23-NE-B	D23-NE-C	D23-NE-D
General aviation	Access				
General aviation/ commercial airlines	Economic impact from increased effective capacity				
	Fuel burn				
Commercial airlines	Training costs				
	Other costs				
Airport/ Air navigation service provider	Infrastructure costs				
	Operational costs				
	Deployment costs				
All	Safety				
Option taken forward to Stage 3		Yes	No	Yes	Yes

Table 42: Runway 23 - Northeast - IOA Summary

Option D23-NE-B is not being progressed to Stage 3.

Out of the four options for departures of runway 23 to the Northeast, there is reasonable evidence that D23-NE-B is the least preferred option and as such will not be progressed to Stage 3. There are no areas where net benefits are to be expected and negative impacts to capacity, resilience and access are anticipated. This option could see capacity and resilience being reduced due to closer proximity to LTMA traffic particularly London Stansted and London City traffic, contributing to an increase in complexity, as well as potentially requiring an increase in CAS to contain the procedures, reducing GA's access to unrestricted airspace. None of the other three options only have potential for negative impacts.

Northwest

Group	Impact	D23-NW-A	D23-NW-B	D23-NW-C
Communities	Noise impact on health and quality of life			
	Air Quality			
Wider society	Greenhouse gas impact			
	Capacity/ resilience			
	Tranquillity			
General aviation	Access			
General aviation/ commercial airlines	Economic impact from increased effective capacity			
	Fuel burn			
Commercial airlines	Training costs			
	Other costs			
Airport/ Air navigation service provider	Infrastructure costs			
	Operational costs			
	Deployment costs			
All	Safety			
Option taken forward to Stage 3		Yes	No	Yes

Table 43: Runway 23 - Northwest - IOA Summary

Option D23-NW-B is not being progressed to Stage 3.

Out of the three options for departures of runway 23 to the Northwest, there is reasonable evidence that D23-NW-B is the least preferred option and as such will not be progressed to Stage 3. There are no areas where net benefits are to be expected and negative impacts to capacity, resilience and access are anticipated. This option could see capacity and resilience being reduced due to closer proximity to LTMA traffic and London Stansted departures to the south as well as potentially requiring an increase in CAS, due to the current lateral dimensions being exceeded, reducing GA's access to unrestricted airspace. Conversely the other two options have no expected negative impacts in any area of the appraisal.

South/Southeast

Group	Impact	D23-S-A	D23-S-B	D23-S-C
Communities	Noise impact on health and quality of life			
	Air Quality			
Wider society	Greenhouse gas impact			
	Capacity/ resilience			
	Tranquillity			
General aviation	Access			
General aviation/ commercial airlines	Economic impact from increased effective capacity			
	Fuel burn			
Commercial airlines	Training costs			
	Other costs			
Airport/ Air navigation	Infrastructure costs			
	Operational costs			

Group	Impact	D23-S-A	D23-S-B	D23-S-C
service provider	Deployment costs			
All	Safety			
Option taken forward to Stage 3		Yes	Yes	No

Table 44: Runway 23 - South/Southeast - IOA Summary

Option D23-S-C is not being progressed to Stage 3.

Out of the three options for departures of runway 23 to the South, there is reasonable evidence that D23-S-C is the least preferred option and as such will not be progressed to Stage 3. There are no areas where net benefits are to be expected and negative impacts to communities, capacity and access are anticipated. This option would overfly a higher population density than the Baseline, capacity and resilience would be reduced due to closer proximity to the LTMA and London Gatwick traffic as well as potentially requiring an increase in CAS reducing GA's access to unrestricted airspace. Conversely the other two options have no expected negative impacts in any area of the appraisal and some potential for net benefits would be expected.

8.4. Arrivals Runway 05

Northwest

Group	Impact	A05-NW-A	A05-NW-B	A05-NW-C	A05-NW-D
Communities	Noise impact on health and quality of life				
	Air Quality				
Wider society	Greenhouse gas impact				
	Capacity/ resilience				
	Tranquillity				

Group	Impact	A05-NW-A	A05-NW-B	A05-NW-C	A05-NW-D
General aviation	Access				
General aviation/ commercial airlines	Economic impact from increased effective capacity				
	Fuel burn				
Commercial airlines	Training costs				
	Other costs				
Airport/ Air navigation service provider	Infrastructure costs				
	Operational costs				
	Deployment costs				
All	Safety				
Option taken forward to Stage 3		Yes	Yes	Yes	Yes

Table 45: Runway 05 - Northwest - IOA Summary

South/Southeast

Group	Impact	A05-SE-A	A05-SE-B	A05-SE-C	A05-SE-D	A05-SE-E	A05-SE-F	A05-SE-G
Communities	Noise impact on health and quality of life							
	Air Quality							
Wider society	Greenhouse gas impact							

Group	Impact	A05-SE-A	A05-SE-B	A05-SE-C	A05-SE-D	A05-SE-E	A05-SE-F	A05-SE-G
	Capacity/ resilience							
	Tranquillity							
General aviation	Access							
General aviation/ commercial airlines	Economic impact from increased effective capacity							
	Fuel burn							
Commercial airlines	Training costs							
	Other costs							
Airport/ Air navigation service provider	Infrastructure costs							
	Operational costs							
	Deployment costs							
All	Safety							
Option taken forward to Stage 3		Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 46: Runway 05 - South/Southwest - IOA Summary

8.5. Arrivals Runway 23

Northwest

Group	Impact	A23-NW-A	A23-NW-B
Communities	Noise impact on health and quality of life		
	Air Quality		
Wider society	Greenhouse gas impact		
	Capacity/ resilience		
	Tranquillity		
General aviation	Access		
General aviation/ commercial airlines	Economic impact from increased effective capacity		
	Fuel burn		
Commercial airlines	Training costs		
	Other costs		
Airport/ Air navigation service provider	Infrastructure costs		
	Operational costs		
	Deployment costs		
All	Safety		
Option taken forward to Stage 3		Yes	Yes

Table 47: Runway 23 - Northwest - IOA Summary

South/Southeast

Group	Impact	A23-SE-A	A23-SE-B	A23-SE-C	A23-SE-D	A23-SE-E	A23-SE-F
Communities	Noise impact on health and quality of life						
	Air Quality						
Wider society	Greenhouse gas impact						
	Capacity/ resilience						
	Tranquillity						
General aviation	Access						
General aviation/ commercial airlines	Economic impact from increased effective capacity						
	Fuel burn						
Commercial airlines	Training costs						
	Other costs						
Airport/ Air navigation service provider	Infrastructure costs						
	Operational costs						
	Deployment costs						
All	Safety						
Option taken forward to Stage 3		Yes	Yes	Yes	Yes	Yes	Yes

Table 48: Runway 23 - South/Southeast - IOA Summary

8.6. Preferred Options

8.6.1. Due to the methodology applied in this Initial Options Appraisal, we have not yet conducted any detailed quantitative assessments to make a decision on preferred options at this stage. These will be carried out at Stage 3 during the Full Options Appraisal. These quantitative assessments will include but are not limited to:

- Noise modelling analysis in accordance with Category B standards as defined in CAP2091.
- WebTAG Assessments.
- Overflight assessments.
- Precise track miles calculations detailing fuel burn and CO^2 emission data using the BADA model.
- Detailed CAS requirement assessments.
- More detailed analysis of interdependencies with other airports and the en-route network.
- Monetarised commercial airline costs.
- Monetarised airport costs.

8.6.2. We have discounted three options during this Initial Options Appraisal based on our qualitative assessments. This has slightly reduced the number of options we will be progressing to Stage 3. Some options have been kept to allow respite requirements to be considered.

8.6.3. There will be many interdependencies between various stakeholders involved in FASI(S) compromises and trade-offs may be necessary, these will be guided by ACOG.

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